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Managing the Environment

A Review of Best Practices

Executive Summary

Executive Resource Group
January 2001

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EXECUTIVE
RESOURCE
GROUP *Strategic Public Policy and Management Consulting*

January 31, 2001

Andromache Karakatsanis
Secretary of the Cabinet and Clerk of the Executive Council
Room 6420, Whitney Block
99 Wellesley Street West
Toronto, Ontario
M7A 1A1

Dear Ms. Karakatsanis:

It is a pleasure, on behalf of the Project Team, to submit our report on best practices in other jurisdictions. The report *Managing the Environment* is presented in two volumes. Volume I contains our findings on best practices, our assessment of the current Ontario context, and our recommendations. Volume II (on CD-ROM) contains the various research papers prepared or commissioned by the Project Team.

As requested, our focus has been on identifying best practices in other jurisdictions that could be implemented in Ontario as part of establishing this Province as a leading environmental jurisdiction and a model for others. In doing so, we have also provided you with our assessment of how Ontario is currently positioned against those best practices. Finally, we have provided a series of what we hope are practical and implementable recommendations that we believe will begin to address the goal of establishing Ontario as an environmental management model for others.

As you will read, one of our central conclusions is that all environmental jurisdictions are struggling with similar management challenges and that, although there are many examples of best practices, no single jurisdiction could be described as leading in all areas. What does distinguish leading jurisdictions, however, is the recognition that traditional, narrow approaches alone are insufficient to meet current challenges. Leading jurisdictions have made the public commitment to explore new, innovative, and more comprehensive ways to protect human health and continuously improve the quality of the environment. They have also demonstrated a preparedness to partner in the building of solutions and a willingness to share the results of these efforts.

I would like to take this opportunity to thank those who participated in this review. Their time, experience and insights were invaluable in the preparation of the report. I would also like to thank the members of my project team – Bob Breeze, Sam Goodwin, David Girvin, John Haffner, and Morris Ilyniak – for their efforts and commitment throughout the past several months. Bob Breeze's contribution was particularly important, including his leadership, strategic insight, and stewardship of a significant piece of research on integrated compliance assurance.

Sincerely,

Valerie A. Gibbons

Executive Summary

The following is a summary of Volume I of our report.

1. Overview and Approach
2. The Case for Action: *Strategic Shifts*
3. The Ontario Ministry of the Environment
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6. Environmental Knowledge Management
7. Emerging Issues
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10. Risk Analysis
11. Policy Development
12. The Path Forward for Ontario: Recommendations

1. Overview and Approach

The purpose of this report is to provide the Government of Ontario with an independent review of *best practices* with respect to how environment departments in other jurisdictions meet current challenges and execute their various management responsibilities.

Our project team, under the leadership of Valerie A. Gibbons, a senior partner in *Executive Resource Group* and former Ontario Deputy Minister, was assembled in response to a request from the Government of Ontario through the Secretary of Cabinet.

The origin of our review was the Government's stated commitment to establishing Ontario as a leading environmental jurisdiction and as a model in the future for other jurisdictions to emulate. In this context, our efforts were directed at an overall management effectiveness review of the Ministry of the Environment, which included:

- Developing an understanding of the current management challenges facing the Ministry, with particular emphasis on challenges that are common to most ministries or departments in other jurisdictions.
- Identifying best practices from environment departments in other jurisdictions that can inform and guide the Ministry and the Government in meeting those challenges.

To assist us in our work, we established a central line of inquiry for the project as follows:

> ***What are the defining characteristics of and/or elements that are present in a model ministry or department of the environment?***

The responses we received and the results of our research led us to focus on two different levels of further study:

- To identify what we have referred to as broad *strategic shifts* in thinking that are taking place across leading jurisdictions with respect to complex environmental challenges.
- Within this set of *strategic shifts*, to identify best practices and make recommendations to Government with respect to a number of key functional areas.

Our activities were organized into five categories as follows:

- Internal information gathering with respect to MOE.
- Meetings with 41 external organizations.
- Site visits to and discussions with other jurisdictions.
- Extensive research and literature review.
- Commissioned and project team research reports, including a major paper on environmental compliance assurance.

2. The Case for Action: *Strategic Shifts*

One of our primary assertions is that advice on best practices has to be thoroughly anchored in a larger strategic context of developments in environmental management. We found a striking consensus with respect to changes in mainstream environmental thinking that cut across jurisdictions. This new thinking incorporates major changes in how governments, the regulated community, NGOs, and the public are attempting to deal with challenges.

Consequently, we focused on identifying high-level *strategic shifts* in environmental management that are generally recognized. These high-level *strategic shifts* are the critical underpinning of our review and provide the broader management context that all jurisdictions need to address as part of developing model environment ministries or departments. The table on the following page provides a summary of these *shifts*.

No single jurisdiction has completely or successfully made all of the *shifts*. While most have acknowledged the need for change, each is struggling with how best to make the transition. As a result, individual jurisdictions are at different stages with varying degrees of success in what is in effect a continuum of change.

The first and most important *strategic shift* is overarching and sets the stage for the larger pattern of shifts:

Over-Arching Shift

Towards a strategic approach to Managing the Environment.

This shift involves moving beyond traditional, narrow approaches to environmental responsibilities. Leading jurisdictions acknowledge the inadequacy of the traditional model – often described as *command and control* – as the *primary* or *stand-alone* approach to dealing with the changing and increasingly complex environmental challenges of today and the future.

Leading jurisdictions are actively engaged in trying to move to the next level of dealing with the environment, sometimes referred to as a new vision of *environmental management*. This new vision builds on the strengths of traditional regulation, but also integrates it with a broader, more comprehensive approach. This approach emphasizes continuous improvement for all sources of pollution, multimedia and cumulative impacts, and broader public participation and access to information.

It typically includes less overall emphasis on the role of government as *doer*, traditional regulation and enforcement, and a greater emphasis on the role of government to provide overall *system management*, through a range of partnerships, processes, structures, and tools.

From a Traditional Regulator	***Towards a Strategic Approach to Managing the Environment.***
1. One ministry having sole responsibility for environmental protection	*A high-level, government-wide vision and goals with implementation shared across different departments*
2. A primary emphasis on ensuring compliance with minimum standards for large stationary facilities	*A new and broader emphasis on strategies to promote continuous improvement in environmental outcomes and accountability across all sources of pollution*
3. Traditional program delivery according to municipal or ministry/department area or region boundaries	*A place-based approach with boundaries that make environmental planning sense and facilitate a total cross-media, cumulative approach (such as watershed management)*
4. A primary reliance on traditional investigation, enforcement, and abatement tools	*A more comprehensive, flexible set of regulatory and non-regulatory compliance tools and incentives*
5. A reliance on government to do it all	*An approach based on shared responsibility with the regulated community, NGOs, the public, and the scientific/technical community*

Strategic Shift #1

Towards a high-level, government-wide vision and goals with implementation shared across different departments.

In many jurisdictions, the primary responsibility for the environment has been delegated for the most part to one department of government. Leading jurisdictions are recognizing that the challenge of effective environmental management is broader than one department. There is a growing awareness that the solutions can only be achieved by marshalling and aligning all of the resources of government to achieve a common purpose.

Developing the capacity to deal with the various *strategic shifts* requires a more comprehensive and sophisticated government strategy that:

- Establishes a clear environmental vision for the government as a whole rather than for one or two departments.
- Sets out priorities with measurable goals and objectives – not just for reduced emissions, but also for sustaining human health and the environment and ensuring balance with a strong economy.
- Includes high-level strategies that cut across government departments and other jurisdictions and that engage the regulated community, NGOs, and the public.
- Establishes a strong central capacity for coordinating efforts, ensuring consistency with the vision, and monitoring performance.

Strategic Shift #2

Towards a new and broader emphasis on strategies to promote continuous improvement in environmental performance and accountability across all sources of pollution.

Continuous improvement across all sources of pollution is a critical component of effective environmental management. Traditional environmental regulation has been focused on the relatively narrow approach of ensuring compliance with minimum standards, set and targeted primarily at large stationary point source polluters and managed separately for air, water, and land. This emphasis misses the significant areas of smaller point and non-point sources.

Building on the success of past approaches, leading jurisdictions are turning towards fostering a culture of *continuous improvement*. Continuous improvement means the expectation that environmental conditions and the performance of the regulated community must continue to improve.

It is essential that this direction be reinforced by a foundation of tough, aggressive enforcement using a full range of tools including administrative and court-based penalties.

Strategic Shift #3

Towards a place-based approach with boundaries that make environmental sense and facilitate a cross-media, cumulative approach (such as watershed management).

Most jurisdictions are organized to carry out their activities using approaches that do not necessarily make environmental sense. Typically, this means regulating in terms of distinct media, i.e. separately for air, water, and land, with program delivery based on the geography of municipalities or government offices.

Leading jurisdictions recognize that this approach does not allow them to deal with environmental issues in a manner that *integrates across media* and deals with the *total cumulative impact* on people and places.

The alternative is called *place-based* environmental management, which recognizes that the natural environment has its own ecological and biophysical boundaries. This approach emphasizes geographic convergences of water, land, and air.

Our research indicates a consensus that *watersheds* are an appropriate basic organizing principle for place-based environmental management. Watersheds are reasonably easy to define and remain relatively fixed over time. Also, problems with non-point source pollution are closely associated with run-off patterns.

Adopting a *place-based/watershed* approach requires new and different structures and processes as well as significant changes in how governments, the regulated community, NGOs, and the public work together as part of:

- Establishing ecological boundaries that are flexible in size and scope.
- Drawing heavily on local participation and in some cases, local agencies with delegated responsibilities.
- Working with local publics and the regulated community to establish goals for each *place*, in the form of agreed upon public uses/activities for the various resources within its boundaries.
- Establishing the maximum amounts (*total cumulative load*) of pollution from all sources (including point, non-point and naturally occurring) that can be allowed in that area over a specific period consistent with achieving the agreed-upon uses.
- Ensuring transparent public access to as comprehensive as possible a range of information and data.

Strategic Shift #4

Towards a comprehensive, more flexible set of regulatory and non-regulatory tools and incentives.

Traditional compliance emphasizes inspection, abatement, investigation, and enforcement. The focus is typically on enforcing compliance with minimum standards for larger, stationary point source polluters.

However, the current leading thinking is that our complex environmental problems require more collective solutions including broader participation, changes in behaviour, and cooperation among all stakeholders and across jurisdictions. These more evolved strategies go beyond government dictating what industry must do within a *command and control* model.

The emerging direction is known as an *integrated approach to environmental compliance assurance.* It is much more *performance*-based, rather than *rules*-based, with a greater emphasis on government's role to set outcomes and then work with the regulated community and the public to determine how best to meet them. This approach is based on the concept of a compliance assurance *tool kit* – both regulatory and non-regulatory instruments – that will allow societies to go beyond minimum compliance and address increasingly complex challenges. It also involves:

- A clear understanding that strong, effective, tough inspection, investigation, and enforcement are the essential backbone.
- Accepting that alternatives to traditional enforcement – e.g. economic instruments, compliance assistance, and cooperative agreements – enhance rather than weaken environmental protection.
- Partnerships with industry sectors, NGOs, and local communities.
- Innovation and flexibility as long as the performance goals are being met.
- Dealing more directly and effectively with non-point source emissions.
- Accepting that in some cases, implementation can be delegated to or shared.

Strategic Shift #5 — *Towards an approach based on shared responsibility with the regulated community, NGOs, the public, and the scientific/technical community.*

Traditionally, industry and the public have defined environmental protection almost exclusively as the government's responsibility. As understanding of the complexity of environmental challenges continues to grow, there is a recognition that *governments alone* do not have the resources to do it all, nor is it the most effective approach.

In a model jurisdiction, the approach is one of shared responsibility and partnership through cooperation among stakeholders. Most often, this is achieved through a few key mechanisms:

Delegating responsibility (not necessarily accountability) for some activities to other partners or levels in the system, including:

- Networks of multistakeholder external advisory bodies.
- Local bodies to plan and set priorities within provincial frameworks.
- Locally managed assessments and/or approvals.
- Allowing the regulated community – within clear accountability and verification requirements – to

undertake its own routine monitoring and reporting, including self-certification and third party audits.

- Funding NGOs to take an active role in policy development and monitoring activities.

Transparent sharing of information with the public.

- Many jurisdictions are turning to the public as a critical lever in achieving better environmental outcomes. Transparent reporting programs are being used to put public pressure on poorly performing members of the regulated community.

- Transparent public reporting is felt to play a key role in driving the transition of companies, industries, and economies towards the ultimate goals of continuous improvement and sustainable development.

- Most of the leading jurisdictions we examined recognize who their stakeholders are and the need for, and the value of, their participation and input.

3. The Ontario Ministry of the Environment

Personal and Professional Commitment

As we met with Ministry of the Environment (MOE) officials, we were impressed by their commitment to high quality public service. We also witnessed a strong personal and professional commitment to the environment and an acute awareness of the critical role its effective management plays in each of our lives.

At the same time, we saw an organization under considerable management and operational pressure, as the Ministry makes every effort to balance the requirements of the day-to-day running of its business and programs for the public, with the extraordinary circumstances of recent months.

Current Positioning

In terms of the *strategic shifts*, we would not characterize the overall direction of MOE and environmental protection in Ontario as leading. Although building blocks are in place in a number of areas, the overall impression is one of a somewhat piecemeal approach. It is apparent to us that Ontario is behind the progress in many other jurisdictions and that the gap continues to widen. Without a concerted and strategic effort on the part of the Government and the Ministry, the stated goal of establishing Ontario as a model for others may not be realizable.

As a group, the Ministry's senior management team and individual executives demonstrated a strong awareness that traditional models of environmental protection, however effective in the past, have been pushed as far as possible.

In our discussions, we saw evidence of a genuine MOE effort, despite the challenge of day-to-day pressures, to monitor and stay abreast of developments in other jurisdictions.

More importantly, we witnessed an awareness of the broader developments – the *strategic shifts* – in environmental management that are underway in other industrialized nations. Among Ministry executives – as with our discussions with most external organizations — there appeared to be strong support for moving in these directions.

Need for A Coherent Strategy

One of the single biggest issues facing MOE and the Government is the absence of a vision for the future of environmental management in Ontario that incorporates the various *strategic shifts*. The purpose of this vision is not only to bring coherence to MOE's internal efforts, but also to provide for greater coherence and therefore more effective coordination of effort towards a common purpose, across all affected Government ministries and agencies.

Despite internal awareness of these approaches, the Ministry to date has not made progress towards articulating this vision more fully and developing the political and public consensus, including policy, program, and organizational options, to make it a reality. It was apparent to us that a core of the Ministry is firmly entrenched – philosophically, culturally, and programmatically – in a traditional *command and control* approach. While there are examples of *leading edge-type* initiatives emerging from various creative centres in the organization, these do not fundamentally challenge the traditional approach. The result is a set of confused or mixed messages to the public, the regulated community, and NGOs with respect to the Ministry's true position on issues such as partnership, innovation, moving beyond compliance with minimum standards, and other directions for the future.

With this in mind, we can point to a number of program initiatives, most already in place or underway, and one that was not implemented, that provide building blocks for future development. For example:

- MOE's *mix and match* of programs to monitor, assess and report on the quality of the natural environment and emissions.
- Ontario has experience in developing individual voluntary initiatives to support pollution prevention that could become part of an integrated compliance assurance approach.
- MOE already has a framework for cooperative agreements – albeit unimplemented – in the REVA program (Recognizing and Encouraging Voluntary Actions).
- Ontario has 100 already-identified watersheds through local conservation authorities.
- New regulations requiring reporting from industrial and commercial emitters are consistent with the *strategic shift* of sharing responsibility and over time, can be developed into a more comprehensive system to ensure public access to information about environmental performance.

- Recent legislative changes to allow for the use of administrative penalties, as opposed to long and laborious court proceedings.
- The *Environet* information technology initiative can serve as a first step towards a broader and more comprehensive environmental Knowledge Management.

Management Lessons from Other Jurisdictions

Based on our research and discussions, three factors have been particularly important to the ability of other jurisdictions to move ahead.

Strong political commitment and leadership:

- Making the decision to undertake the *journey*.
- Providing political energy and direction to sustain the effort and to ensure goals are achieved.
- Working with senior officials across ministries to develop a common vision and implementation strategy.
- Ensuring continuity in terms of people in leadership positions.

Recognition that effecting cultural change and adopting alternatives to long-standing and apparently successful business practices in any organization is usually very difficult:

- The predominance of the *command and control* mentality is something with which even the most visionary jurisdictions continue to struggle.
- To date leading jurisdictions have achieved varying degrees of success with respect to fundamentally changing how they do business.
- We were often cautioned not to underestimate the complexity of changing the traditional orientation and the time and resources required.

Availability of resources to support strategic direction setting and the process of making change.

- Establishing government as a centre of strategic knowledge and a leader in developing broader government and public understanding.
- Broadening and deepening engagement of the public, regulated community, and NGOs.
- Re-establishing and/or building anew partnerships with the scientific, research, and technical communities.
- Creating essential management tools and information technology infrastructure.
- Providing the resources required to effectively plan and successfully implement organizational and cultural change.

4. Environmental Compliance Assurance

Compliance assurance consists of public and private instruments that can be used to compel firms (and individuals) to conform with formal environmental regulations or with informal rules of conduct and social norms to protect the environment.

Many leading jurisdictions are moving towards an *integrated* approach to environmental compliance assurance: a complementary mix of education, validation (e.g. joint monitoring or research), positive and negative recognition, negotiation and compulsion.

Such a commitment would also have a profound impact on the organizational culture – the work norms and practices – of MOE.

We reach a number of conclusions in this area:

Worldwide, there is a pronounced trend towards an integrated approach to environmental compliance

With a backdrop of strong enforcement, integrated compliance assurance focuses on environmental performance and policy outcomes.

The integrated compliance assurance tool kit includes a variety of enforcement, abatement, cooperative agreement, compliance assistance and economic instruments. While emphasizing flexibility and effectiveness, the basic premise is that the policy *end* drives the selection and design of a compliance instrument or set of instruments. The four main policy ends are:

- Controlling point pollution sources.
- Reducing priority pollutant emissions.
- Controlling non-point pollution sources.
- Encouraging continuous improvement

Integrated environmental compliance assurance fosters a commitment to continuous improvement in environmental performance.

Integrated environmental compliance assurance is performance-based, recognizes leaders, provides incentives, and supports the regulated community to go beyond minimum standards. It brings together government, business and communities to resolve complex, collective action problems on a sectoral or local basis where regulatory penetration is weak or non-existent, including non-point source pollution.

Accountability for environmental performance by both governments and companies is inextricably linked to a comprehensive environmental monitoring and reporting system with integrated and publicly accessible databases.

To be effective, an integrated environmental compliance assurance strategy must maintain a strong abatement and enforcement presence.

The literature strongly supports the view that cooperative compliance initiatives are effective if they are backed up by the threat of credible enforcement action.

Leading jurisdictions are enhancing their enforcement and abatement functions through *risk-driven targeting* to set priorities for multimedia investigations and cases, as well as remote computer-assisted inspections, compliance assistance in the early stages of facility approvals, and comprehensive training programs for their environmental officers.

MOE

In looking at leading jurisdiction and drawing comparisons with MOE, we observe that the Ministry has made little or no progress towards where leading jurisdictions are currently in terms of new and innovative approaches to integrated environmental compliance assurance. Attempts to bring forward initiatives that reflect this approach have been marginalized within the Ministry on the grounds that they would jeopardize ongoing and future abatement and enforcement efforts.

Although there have been numerous attempts to initiate cooperative agreements there has been little progress in recent years. In the area of compliance assistance, MOE often develops effective communication strategies for new program and regulatory initiatives. These strategies are delivered by program staff with involvement of the Ministry's Operations Division, but are not sustained much after the initial outreach to the principle stakeholders has been accomplished.

While MOE is involved in a pollution prevention focused initiative with large, medium, and small enterprises, there is no broad, ongoing program to provide compliance assistance. Ontario has not been a leader in using economic instruments. While the Province has initiated several pilot projects, these have not been part of a broader more integrated approach to compliance assurance.

5.0 Governance for Environmental Management

Our review indicates that little formal research exists with respect to the effectiveness of various governance models for environmental management.

To a certain extent, the balance struck between centralization and delegation is rooted as much or more in constitutional or political considerations, as it is in environmental considerations. Where a government tradition or culture of delegation to local authorities or different levels of government exists, it is more likely that some degree of delegation exists in the environment area as well.

There is some evidence that other factors – most notably political leadership and commitment, the breadth of a government's vision, and the extensiveness of public, NGO, and regulated community involvement in policy development and consensus building – may be more important than governance in terms of overall impact.

Our research supports the view that the environment is a policy and program field that cuts across traditional mandates of government line departments as well as other jurisdictions. A number of jurisdictions have established strategic visions for the environment, including cross-government goals and performance targets. Often, these approaches include a high-level centre of responsibility for coordination and monitoring of results.

Many jurisdictions place strategic direction setting, policy formulation, standards, and other high-level functions in some form of a ***ministry of the environment***, headed by a member of the Cabinet. In many cases, responsibility for actual delivery, including operational policy, enforcement, assessment, permitting/licensing, monitoring, research, etc. rests with an arms-length agency of government and, in some cases, regional or municipal governments. The benefits of this approach include:

- Greater opportunity for the ministry to focus on cross-government strategic direction and coordination, broad policy formulation, and monitoring against government goals and targets.
- Greater flexibility and opportunity, through operating agencies, to engage the regulated community, NGOs, the scientific and academic communities, and the public in more open and transparent information sharing, dialogue, consultation, and partnerships.

MOE

MOE is a very centralized organization. Although the Province of Ontario has a long tradition of creating and using other organizations as instruments of public policy implementation, MOE currently does not delegate its core functions to other operating organizations, e.g. operational policy development, public consultation, standard setting, assessment, permitting inspection and abatement, investigation and enforcement.

In addition, MOE has not created the range of environmental advisory bodies – for example, for research, technical, innovation, and/or policy advice – that we saw in many other jurisdictions.

This degree of centralization has contributed to the tendency of day-to-day operational pressures and requirements to dominate the time, attention, and resources of all parts of the Ministry and drive the overall Ministry agenda. It is one of a number of factors that impact negatively on the Ministry's ability to focus on strategic capacity and deal with long-term, crosscutting issues and concerns. The Ministry is also not benefiting from opportunities for greater independence and flexibility in terms of regulatory/enforcement decision-making or stakeholder engagement.

6. Environmental Knowledge Management

Knowledge Management – the ability to acquire, create, add value to, broadly share, and use information – continues to gain ground as an overarching strategic tool for improving business performance. However, in terms of implementation in the public sector, it is what we would characterize as an *emerging* best practice.

Having said this, our research indicates that a planned, enterprise-wide approach to Knowledge Management is critical to any jurisdiction's ability to implement the *strategic shifts* identified in this report. Therefore, a characteristic of a leading environmental management organization is one of heavy dependence on effective information and knowledge flows.

A Knowledge Management strategy levers the organization's knowledge and learning capacity in ways that assist with the achievement of their overall directions. It provides the vision and integrating framework for the various knowledge and information based activities in our report. It is clear from our research that in the absence of such a plan, the full benefits of the new directions we are proposing may not be fully realized.

There are few examples of public sector organizations that have implemented what we would call mature enterprise-wide Knowledge Management strategies. Our observation is that public sectors are generally aware of Knowledge Management frameworks and their potential/theoretical applications and benefits. However, few jurisdictions have had the time, resources, leadership, and/or strategic focus to adopt a comprehensive approach.

Notwithstanding, many leading environmental jurisdictions have noted that successful implementation of their strategic directions is heavily dependent on various explicit or implicit approaches to Knowledge Management. A number of these organizations are working towards an organizational culture, information technology environment, and external relationships that will enable effective and efficient Knowledge Management.

MOE

Over the past 15 to 20 years, most public sectors, including Ontario's, have tended to emphasize the importance of information and data, as opposed to the ability to create, manage, and use external and internal knowledge. This has been the result of a lack of leadership attention, ongoing constraints, an emphasis on protecting program delivery, and limited investments in technology. The outcomes have included:

- A general trend towards devaluing the legitimate role of the public service to build a strong internal and external knowledge creation and analysis/synthesis capacity and to demonstrate leadership in the creation and dissemination of knowledge and information.
- A steady erosion of historic links to the research and academic communities to the point that such links are almost non-existent today.

Our analysis indicates significant gaps within MOE in the knowledge and information required to support broader, crosscutting policy development and leading edge business strategy development and implementation. Furthermore, there are gaps in MOE's present ability to acquire and manage that knowledge and the knowledge development process for the future.

Over the past two years, MOE made use of external consultants to examine the possibility of adopting a strategic approach to Knowledge Management. The design principles and potential strategies that resulted are quite comprehensive and very consistent with the elements of the framework proposed in this report. However, the initiative as originally conceived has not moved forward within the Ministry. In light of a number of challenges, the Ministry has focused time, effort, and available resources on the *Environet* information management strategy.

Environet in its current form is an information technology plan and not a Knowledge Management strategy. It is a series of program delivery-focused information and information technology initiatives that will, in the short term provide significant operational benefits for the Ministry. Understandably, *Environet* was developed to facilitate the Ministry's current traditional way of doing business, as opposed to enabling it to deal with the *strategic shifts* identified earlier in our report.

7.0 Emerging Issues

Our research indicates that a process to identify and address emerging issues is an important building block of an environmental Knowledge Management strategy. However, our review also suggests that the institutionalized use of formal tools for identifying and addressing emerging issues should be included among those that we would characterize as *emerging* best practices in leading jurisdictions.

Leading organizations utilize some form of *foresight* process for the systematic and regular assembly of views about possible new issues. They prioritize the issues based on explicit criteria, and focus decision-making based on this analysis, including new policies and programs, monitoring, and research that might be required.

There is a consensus that an emerging issues process provides for earlier and more effective preventative and remedial action and for better management and investment decisions for scarce policy, operational, scientific, and research resources, as well as enhanced marketing opportunities for new products, services, and technologies. In the absence of this kind of process, there is the potential for fragmented, single disciplinary approaches to dominate, resulting in lost policy and economic opportunities.

Although there is extensive literature that notes the value of an emerging issues process for strategic planning, environmental scanning and futures analysis, environmental organizations have not generally implemented systematic approaches. The typical approach is more informal, less structured and not always clearly tied to overall business goals and strategies.

MOE

As with many other environmental organizations, MOE does not currently have a formal emerging issues process that is part of an established Knowledge Management strategy and that is integrated into the organization's strategic planning, policy development, operational planning, and outreach activities.

Having said this, Ministry officials certainly recognize the value of and need for this kind of process in terms of improved internal understanding and decision-making, as well as for broadening stakeholder and public participation/partnerships in environmental management.

In the past, the Ministry has undertaken a number of future thinking exercises, using a variety of methodologies and approaches that incorporate many of the elements of the framework presented earlier in this section. Generally, however, these have been ***one-off*** exercises, rather than an institutionalized component of the strategic business planning process. Expectations for how the results would be used to inform ongoing decision-making across the Ministry, let alone other ministries, were not set. As well, these one-off processes were usually internal government exercises with limited opportunities for outreach and open external participation in the process and were not viewed or used as opportunities to build broader external understanding and consensus.

More recently, within these limitations, the Ministry has made a number of important and valuable efforts to strengthen its capacity in this area and adopt a more formalized approach. A major external study from January 2000 included an appropriate conceptual framework and detailed recommendations for the design and ministry-wide implementation of a formal emerging issues process.

At this stage, the Ministry and the Government have not made a decision with respect to moving forward with the approach recommended by the external consultants. Factors affecting this decision include a lack of management/staff time and resources to undertake this kind of regular and substantive knowledge- building exercise, possible concerns about whether the products will actually be utilized to enhance decision-making, and the absence of a clear mandate/direction with respect to the value of broader consensus building exercises.

8. Environmental Monitoring and Reporting

The availability and accessibility of comprehensive environmental information is a cornerstone of effective environmental management and an integral part of an environmental Knowledge Management strategy. A well-developed environmental information system helps to identify emerging issues and to frame informed discourse on these issues. It is also essential to help identify options for action and to evaluate performance.

The following are our conclusions in this area:

There is a trend towards monitoring and reporting systems that integrate broad environmental data to support decision-making.

- The emphasis is moving from increasingly sensitive analytical equipment to information systems that integrate, correlate and manage data produced by monitoring equipment. Broader environmental reporting is being used to show the interconnections among environmental, economic and social issues and to help demonstrate and improve performance.

What is being monitored is changing to better define ecosystem health and the effectiveness of environmental management systems.

- Environmental indicators offer a more meaningful way of tracking progress and integrating information. Indicators address broad desired outcomes such as water that is safe to drink and fit for swimming. Biomonitors (e.g. censuses of fish and aquatic invertebrates) are being used by more jurisdictions as early warning indictors of watershed stress.

Monitoring and reporting systems are being designed and managed in partnership with the private sector, the public and other jurisdictions.

- New technologies are enabling a move away from top-down reporting where experts tell people what they think they should know. Information portals in leading jurisdictions allow people to conduct their own queries using centralized data.. Monitoring programs are being designed with public and private stakeholder consultation on a watershed basis. These approaches reflect the view that a better-informed public can participate more meaningfully. As well, information is being integrated and shared across jurisdictional boundaries. This is a critical development to sustain cooperative action on trans-boundary pollution issues.

MOE

MOE had a long history of being a leader in environmental monitoring and was at the forefront of many of the analytical advances over the last forty years. It has retained a number of experienced staff with considerable chemical and biological monitoring expertise.

The Ministry has a large number of databases and monitoring programs. However, integration of these databases is only just beginning. Without this integration, MOE will not be in a position to respond to the strategic shifts including effectively reporting on the environment or progress in achieving environmental outcomes.

Participants in our review noted that the Ministry has not been investing adequately in its monitoring program for the Great Lakes and associated watercourses. In addition, MOE has not kept pace with the leading US states in developing some of the new biomonitoring and environmental indicator approaches. As well, MOE has not invested sufficiently in information portals to provide the private sector and the public with information on environmental quality compared to leading jurisdictions.

Information is difficult to obtain and understand through MOE's website.

9. Access to Scientific & Technical Expertise

As identified throughout our review, knowledge and information are critical to effective environmental management. To varying degrees, a strategic approach to Knowledge Management is a characteristic of leading environment departments. The specific component of accessing scientific and technical expertise is especially important, given the universal requirement for strong science to support decision-making.

Our research indicates that most public sector organizations have been challenged in the past decade or more by budgetary constraints leading to the downsizing or elimination of both in-house and external research and development capacity.

Notwithstanding this more general trend, leading environmental jurisdictions continue to engage in or substantially support research and development activities employing a range of approaches to identifying the issues to be researched and the acquisition of scientific and technical expertise. These jurisdictions rely, to varying degrees, on relationships with professional research organizations and academia to enhance their own knowledge and that of stakeholders, including the regulated community, NGOs, and the public. There is also a strong element of external transparency in the research activities of leading jurisdictions.

For most jurisdictions, the primary emphasis continues to be on scientific and technical expertise to address specific problems. However, consistent with our *strategic shifts*, we observed a growing and important emphasis on broader areas of research, including longer-term environmental (e.g. physical, chemical, biological, geological), sociological, and economic issues that have implications for environmental management in the future.

MOE

Over the past decade or more, the Ontario Government, including MOE, has experienced fiscal pressures and changing priorities that have led to the significant downsizing and/or elimination of the research and development function and relationships with external research organizations in many ministries. The Ministry has maintained a core of scientific advisory and technical people that is primarily focused on the current program agenda.

Ministry officials are aware of the need to broaden and deepen the organization's base of scientific and technical expertise both internally and externally, and to strengthen the use of other disciplines such as sociology, economics and law. At present, however, the Ministry – as with many other ministries and governments – currently does not have a research and development strategy that:

- Is an integrated component of the organization's vision and strategic business plan.
- Focuses on the overall knowledge and information necessary to achieve the vision.
- Builds external partnerships and collaboration, and incorporates external expertise and advice.
- Allocates resources to agreed-upon research priorities.
- Is enabled by technology that facilitates organizing, accessing, sharing, communicating about, and using internal and external knowledge and expertise.

In the absence of such a strategy, the Ministry is very focused on the scientific requirements for standards development and approvals and to support day-to-day operations. The organization does not appear to have a well-developed internal or external capacity in place to conduct broader, longer-term research and analysis or demonstrated experience to manage broad processes of external involvement and partnership. While knowledge and expertise exists in various *pockets* around the Ministry, it is not easily made use of, i.e. identified and catalogued, benchmarked against strategic priorities, shared/accessed, or used on a consistent basis to support decision-making.

10. Risk Analysis

Science-based risk assessment – the primary tool used to develop standards – has long been a critical component of environmental management. However, leading jurisdictions are developing a new approach to dealing with more complex environmental risk issues. This approach is called Risk Analysis and includes three components:

- Risk assessment.
- Risk management.
- Risk communications.

Most people seem to agree that Risk Analysis is a valuable tool for environmental management but there is some debate with respect to how Risk Analysis should be used and how much influence it should have on government decisions. Given this debate, Risk Analysis is one of those areas that we would characterize as an *emerging* best practice.

Many environmental jurisdictions have traditionally focused their activities primarily on science-based risk assessment, with little attention paid to other disciplines such as sociology, economics, law, and aspects of health sciences, or the emerging areas of risk management and risk communication.

Traditional risk assessment is generally based on science and focused on the *one chemical/one media* model. It does not deal effectively with multichemical, multimedia, place-based approaches. Processes for external engagement are typically *back end* and focused primarily on challenges associated with implementing risk assessment decisions. They do not include extensive external involvement in the risk assessment and risk management analysis and deliberations themselves.

Leading jurisdictions have recognized that these traditional approaches cannot deal with more comprehensive environmental management, incorporating concepts such as continuous improvement, place-based, total cumulative impact, sharing responsibility, and transparency. In response, they are developing new approaches, including:

- Recognizing that risk assessment, risk management, and risk communication require different skills and expertise, but together make up one framework that should be applied consistently across an organization.
- Moving beyond the *one-chemical/one-media* approach to a more comprehensive and complex *ecological risk assessment* model that addresses the cumulative impacts of multiple chemicals and other stressors on human health and ecosystems.
- Public engagement that is transparent, as inclusive as possible, and begins early on in the process, including up front external participation in priority setting and in the analysis and deliberations related to the risk assessment and risk management phases.

Beyond environmental management, we did not find evidence that Risk Analysis is generally being applied more broadly and formally to the management of public sector organizations as a whole, i.e. overall strategic priority setting, stakeholder and public participation, and resource allocation.

MOE

MOE is firmly positioned in the mainstream of environmental organizations with respect to Risk Analysis. By this, we mean that the Ministry's primary emphasis has been on the science-based risk assessment component of Risk Analysis as opposed to risk management or risk communication.

In terms of a more comprehensive use of Risk Analysis, the Ministry has not developed an overall policy framework for Risk Analysis that integrates risk assessment, with fulsome approaches for risk management and risk communications.

The Ministry's current approach to risk assessment does not address the critical challenge of multi-chemical, multimedia, and place-based approaches to Risk Analysis, i.e. ecological risk assessment.

The Ministry's current approach to risk communication is not well developed. Our review suggests that stakeholder involvement is limited, as opposed to part of an institutionalized approach to public engagement. The primary focus appears to be on communicating with industry with respect to the issues associated with implementing a particular standard, as opposed to creating broader partnerships, trust, and understanding throughout the process.

11. Policy Development

The capacity to identify and address issues that cut across traditional program areas and address longer-term, strategic challenges is a key component of effective environmental management. The policy development function, supported by the knowledge gained through the emerging issues process, management and evaluation data, research, and contact with external expertise, is one of the most important tools for achieving this goal.

At a high level, most jurisdictions are struggling with the need to redefine and strengthen their policy capacity to be more strategic, i.e. long-term, crosscutting, more knowledge based. This development is in response to the growing recognition that policy development in most jurisdictions, including what is often described as *strategic* policy development, most often is narrower and more prescriptive program policy and program design.

However, few have isolated the policy development function as a form of *discipline* within public sector management. By this, we mean dealing with it in a manner that is comparable to the professional development thinking that has occurred in other recognized functions, i.e. finance and administration, human resources, communications, and information technology.

Of those organizations that have recognized the need for strengthening the policy area, few have developed what we refer to as a *comprehensive approach* to managing and developing this function. These organizations tend to focus their efforts on a small number of specific components, e.g. improving research capacity, renewing linkages with outside organizations, or improving recruitment strategies.

Within the Ontario Government, the Ministry of Community and Social Services is an example of an organization that initiated a comprehensive approach. This initiative is part of the ongoing project to restructure the Ontario Public Service. This Ministry's efforts encompassed both the substantive component of public policy development, as well as the professional development of the policy function as part of the ongoing management within government.

MOE

Our review indicates that the Ministry's approach to the policy function – which we would characterize as very focused on the considerable day-to-day program policy pressures it faces – is consistent with that of many environmental and other government organizations. By this, we mean that the Ministry has not addressed either the requirements for a strategic approach to policy development, or the development of the policy function as a professional discipline within public sector management.

As with many environmental and other organizations, the policy function within MOE is currently organized by program/media silos. Within these silos, the focus is primarily on program policy and program design. Given this approach, and the significant day-to-day program policy pressures facing it, the Ministry currently has a limited capacity to identify, analyze, and manage strategic, cross cutting, multi-ministry, complex issues. In terms of central strategic capacity, the Ministry does not have an assigned centre of responsibility for dealing with these kinds of issues.

With respect to the knowledge and information required to support good public policy development, we observed:

- A general decline in the ability to manage external and internal knowledge and information because of limited resources and a lack of clarity related to the legitimate role of the public service in this area.
- Steady erosion of historic links to the external information sources.
- A lack of definition with respect to the specific knowledge and information required to support crosscutting strategic policy, program policy and program design, implementation planning, and ongoing monitoring and evaluation of policy outcomes.

Current Ministry information technology plans do not, at this stage, specifically address the information needs required to support policy formulation for either media-silos or in an integrated manner.

12. The Path Forward for Ontario: Recommendations

The Magnitude of Change

Establishing Ontario as a leading jurisdiction in environmental management represents a significant challenge that is not one of:

- Tinkering at the margins of existing programs.
- Creating a few new programs to overlay on what is already in place.
- Simply implementing a new information technology system.
- Restructuring various parts of the organization.

Rather, the strategic shifts we identified represent a fundamental conceptual and philosophical change in thinking and orientation. By *Ontario*, we mean MOE, but also other ministries, the regulated community, NGOs, and ultimately the public.

Allocating Sufficient Resources

Our view is that implementation and transition management cannot be accomplished within existing structures or within existing resources. Effective implementation and transition planning and oversight will require:

- Dedicated, experienced, senior leadership at the political level.
- A significant core of human and financial resources for a period of at least three to five years that will draw on additional dedicated resources from across government.

- Resources to support the development and implementation of an integrated approach to environmental compliance assurance.
- Resources to support new monitoring systems.
- New capacities to create, share, and use knowledge internally and externally.
- Significant investment in information and information technology.
- Creating new formal and informal mechanisms and approaches to broader outreach and participation of stakeholders and the public.

Adopting a Change Management Approach

We are recommending that the development and implementation of the changes be conducted within a formal commitment to a Change Management approach and process. This approach should acknowledge and address the changes required both inside and outside the government and be infused in the process from the very beginning: identifying the need for change, creating buy-in, developing specific strategies, and implementing specific strategies.

Recommendation #1

Implementation/Transition Structure and Processes

In our view, successful implementation will require strong leadership and new structures and processes that send a strong public signal that change will occur and that force the transition to take place. To that end, we recommend the creation of a dedicated implementation/transition capacity within the Ontario Government including a number of new structures and processes:

- An expanded, cross-ministry leadership role for the Minister of the Environment, supported by a Cabinet Committee Responsible for Implementation and Transition.
- A new Associate Deputy Minister for Implementation and Transition, an Implementation and Transition Secretariat, supported by an advisory Deputy Ministers' Committee.
- An External Advisory Council.

Under this proposal, the Minister would have responsibility for overall direction of implementation and transition activities as well as recommending to Cabinet the government-wide vision, goals, and strategy.

The Minister would chair and be supported by a new Cabinet Committee for Implementation and Transition that would oversee implementation and ensure coordinated efforts and participation within their home ministries.

The Minister would be supported, through the Deputy Minister, by an Associate Deputy Minister for Implementation and Transition and an Implementation and Transition Secretariat. This Associate Deputy Minister would be responsible for directing and coordinating the development and implementation of the government-wide vision, goals, and strategy. This would include: overall plan development, establishing priorities, coordinating activities and input across the various ministries affected, implementation, managing the various transitions required, and monitoring progress against expected results.

The Associate Deputy Minister would draw on the following:

- *An Advisory Committee of Deputy Ministers* from the participating ministries, to provide oversight of the process and to ensure clear and consistent direction within those ministries.
- *A dedicated Secretariat for Implementation and Transition* responsible for supporting the coordination of efforts across the various ministries, including leading the development of strategies, implementation plans, and monitoring implementation activities and results.
- *Assistant Deputy Ministers and small, dedicated implementation and transition teams* in each participating ministry, with a formal *dotted line* reporting relationship to the Associate Deputy Minister.

The Implementation and Transition process would be informed by advice on strategy development, implementation, and related transition issues from an External Advisory Council comprised of outside experts, stakeholders, and representatives of the general public.

- Scientific, research, policy, and academic communities.
- The regulated community including private industry, utilities, and municipalities.
- Environmental and other NGOs.
- The public.

We recommend that the processes and products of the Advisory Council and its sub-committees/working groups be as open and transparent as possible, including the use of the Internet to share information with and engage a broader audience.

Recommendation #2

Create an Environmental Management Vision for Ontario

We recommend the creation of a high-level government-wide vision of environmental management in Ontario that cuts across all affected ministries. This vision would be broadly scoped to provide consistent guidance and direction for all ministries and be clear with respect to roles of those ministries.

The vision would include high level and detailed outcomes that are clearly and measurably expressed in terms of sustaining human health and ecosystems. The vision should also address each of the strategic shifts identified in our review, as well as clearly articulate the *end state* that the Government is committed to achieving, i.e. a measurable statement of what will be different for government, the regulated community, NGOs, and the public at the end of the change.

Recommendation #3

Governance for Environmental Management

Many jurisdictions place strategic direction setting, policy formulation, standard setting, and other high-level functions in some form of a ***ministry of the environment***, headed by a member of Cabinet. In these cases, operations/delivery is often vested in agencies or, in some cases, local authorities or other levels of government.

The practice of creating arms-length operating agencies for a wide range of functions, including regulation, has long been part of the tradition of government in Ontario. In addition, the stated direction of the current restructuring of the Ontario Public Service is to expand this decentralization of delivery and focus more within the Government on policy and standard setting.

For these reasons, we believe that at some point in the future, the Ontario Government should give careful consideration to the creation of an arms-length operating agency for operational/program delivery of environmental management. Responsibility for policy, program design, and monitoring and accountability for performance would be retained at the ministry level.

However, we would not recommend the creation of an operational agency at this time. Given the significant changes required, and in particular the cultural change necessary, we would suggest that to do so would make the initial implementation and transition process more difficult.

Recommendation #4

Implementing an Integrated Approach to Environmental Compliance Assurance

We recommend the design, development, and implementation of an integrated approach to environmental compliance assurance. This approach would use all of the tools in the compliance tool kit selectively, effectively and comprehensively. This integrated approach would be performance based, encourage innovation, recognize leaders, provide incentives, offer technical assistance to improve performance, and focus oversight and enforcement on those not meeting performance requirements.

With respect to strong enforcement, we recommend:

- Giving MOE the authority to directly impose timely and significant administrative penalties.
- Supporting the pilots that are being managed by the Inspection, Investigation and Enforcement Secretariat at the Ministry of Labour for handheld computer systems.
- Establishing expectations and commitments for timing related to preparing and processing Crown Briefs as part of the enforcement process.

With respect to a more strategic approach to environmental approvals, we recommend:

- Revising current legislated approval processes in order to integrate self-certification, tiered, and whole-facility approaches.

With respect to developing a consensus on integrated compliance assurance among other ministries, the regulated community, NGOs, and the public, we recommend:

- Initiating a broad discussion, drawing on leadership from the External Advisory Council, to create a consensus for moving ahead that would include the development of principles, preconditions, policy frameworks, and legislative changes that might be required.
- That this process be seen and utilized as a major opportunity to communicate with and educate the broader public on new approaches.

We also recommend:

- Two *Cooperative Agreement* pilots that would incorporate a tiered approach to promoting higher levels of performance for increased flexibility and has degrees of public involvement tied to the various tiers.
- Two *Compliance Assistance* pilots that would build on the work of MOE's Partnerships Branch and reach out to small and medium sized establishments that have not developed the technical capability and management systems to achieve environmental goals.
- Two *Economic Instruments* pilots that would address applications such as user (polluter) pays, tax incentives and disincentives, capital cost allowances, trading schemes, etc. for large and small businesses, as well as the public.
- The development of a *Project XL*-type innovation program as an opportunity to look at additional effective ways towards improved compliance and continuous improvement beyond minimum standards.

Recommendation #5
Implementing a Comprehensive Environmental Knowledge Management Strategy

Given the central role that Knowledge Management plays in effective environmental management, we recommend that:

- The Government's environmental management vision for the Province contain an explicit cross-ministry commitment to Knowledge Management as a fundamental building block for attaining the vision.
- This vision be based on the framework proposed in *Research Paper #5* and that Ministry and cross-ministry strategies be developed that are consistent with the principles outlined.
- Ensure consistent, strong senior leadership and sponsorship of

initiatives, driven by the core business divisions of the Ministry.

- Investment be made in the technology required to support an environmental Knowledge Management strategy including the identification and acquisition of information required to support the strategic policy, business planning policy/standards formulation and operational requirements.
- The strategy builds on the new reporting requirements for water to expand the menu of information available to the public.
- Consideration be given to using both Business Ontario initiatives and Government Information Centres to facilitate the Compliance Assurance initiatives referenced in Recommendation #4.

Recommendation #6
Identifying and Addressing Emerging Issues

We recommend that:

- The Emerging Issues process, as defined in *Research Paper #6*, be adopted as the methodology to be utilized by MOE, including the identification of an executive lead for the function and the allocation of the resources necessary to establish and develop this function, including the information technology infrastructure required, in consultation with a multistakeholder advisory body.
- The Ministry commit to early integration of the Emerging Issues products into the Corporate Business Planning process and a formal evaluation of the effectiveness/utilization of the process and products.
- The Knowledge Management strategy and the communications of that strategy be linked to the Emerging Issues process, identifying the latter as a fundamental knowledge building block.
- An outreach strategy be developed that is specific to the *concern* phase of the proposed life cycle framework, with an emphasis on building bridges and re-establishing relationships with academic/research community, the regulated community, and NGOs.

Recommendation #7
Access to Scientific and Technical Expertise

We recommend:

- That a multi-ministry environmental research agenda, including a dedicated Environmental Research Fund, be established that reflects the Government's environmental management vision
- The creation of an external research advisory committee to assist in shaping the short and long-term research priorities and to oversee the quality of the research acquired.
- The Ministry provide ongoing staff training in science and technology and establish an outreach agenda for staff at all levels.

- The proposed Knowledge Management strategy be clearly linked to this initiative, identifying it as a fundamental knowledge building block.

Recommendation #8

Environmental Monitoring and Reporting

We recommend the development of a comprehensive environmental monitoring and reporting strategy for the Province, as a component of the overall Environmental Knowledge Management strategy. This approach should:

- Include broad multistakeholder participation at all stages in the development of the strategy.
- Identify the full range of monitoring information that should be in place to support high quality, place-based planning and decision-making.
- Specify and fill the current gaps/lapsed areas in existing monitoring information.
- Modify existing performance and supporting program measures to reflect the new government vision and establish related performance monitoring and management systems.
- Place a strong emphasis on and develop mechanisms to ensure transparency and public access to all types and sources of monitoring information and analysis, and identify the opportunities for partnerships to be developed with the regulated community, NGOs, other organizations such as Conservation Authorities, and the public.
- Ensure that information is integrated and shared across jurisdictional boundaries.

In terms of more detailed actions to be taken, we recommend that the proposed monitoring strategy include the following initial priorities:

- Commit to a comprehensive, renewed monitoring program with early investment in improving the water quality components, including Great Lakes and related monitoring, and investing in the development of indicators and bio-monitoring approaches.
- Commit to the early integration of existing environmental databases and as a first step bring data and information together on a watershed basis.
- Continued commitment to making information available to the public, i.e. monitoring information and information obtained from the regulated community available to the public as soon as it is received.
- Create an Access Ontario Website focused on monitoring and reporting information and analysis, but also public access to data and analytical tools.

Recommendation #9

Risk Analysis

We recommend the development of a policy framework for environmental Risk Analysis consistent with the definitions, principles, and characteristics identified in our research that would include:

- The creation of standardized analytical tools and expectations for use in the risk analysis process that would be mandated for consistent use within MOE and other affected ministries.
- Clear articulation of the expected role and mandate of Risk Analysis in environmental decision-making and ongoing environmental management.
- Taking early opportunities to pilot the use of these tools in actual risk analysis and operational decision-making situations.
- The potential to be applied to the ongoing management and operations of the Ministry, as opposed to just environmental issues.
- Building on the work of the II&E Working Group led by the Ontario Ministry of Labour.

With this framework in place, we also recommend that Ontario begin work to establish an approach that is focused on *ecological risk assessment.*

Recommendation #10

Policy Development

We recommend that the Ministry senior management commit to strengthening policy development capacity through:

- A renewed emphasis on crosscutting, longer-term, strategic policy, in addition to program policy and program design.
- Creating a separate strategic policy unit within the Ministry to focus on crosscutting policy issues that require a strategic response, as well as provide economic advice and analysis.
- Significantly strengthening the program evaluation component of the policy development process.
- Defining, developing, nurturing, and rewarding policy development as a recognized discipline that cuts across traditional program boundaries.
- Establishing structures, processes, tools, and information technology to support a high quality policy development function.

We also recommend the creation of a small secretariat charged with the task of leading a Change Management-oriented transformation of the policy function. Specific activities would include:

- Developing mechanisms for ensuring the involvement of staff in the process.
- Developing a vision of the policy function that includes a strong knowledge-based capacity for delivering strategic, timely,

informed, comprehensive policies that address complex, crosscutting environmental issues.

- Identifying specific knowledge and information required to support the full range of policy development activities, including current gaps.
- Identifying the range of skills and competencies required within the Ministry or externally, including current gaps.
- Taking steps to ensure that the policy development function is well represented in the development of the proposed environmental Knowledge Management strategy.

Managing the Environment

A Review of Best Practices

Volume 1

Executive Resource Group
January 2001

Managing the Environment

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1.0 Introduction and Approach

1.1 Origins and Scope

The purpose of this report is to provide the Government of Ontario with an independent review of *best practices* with respect to how environment departments in other jurisdictions meet current challenges and execute their various management responsibilities.

Our project team, under the leadership of Valerie A. Gibbons, a senior partner in *Executive Resource Group* and former Ontario Deputy Minister, was assembled in response to a request from the Government of Ontario through the Secretary of Cabinet (See *Appendix A* for a list of project team members).

The origin of our review was the Government's stated commitment to establishing Ontario as a leading environmental jurisdiction and as a model in the future for other jurisdictions to emulate. In this context, our efforts were directed at an overall management effectiveness review of the Ministry of the Environment ("the Ministry" or "MOE"), which included:

- Developing an understanding of the current management challenges facing the Ministry, with particular emphasis on challenges that are common to most ministries or departments of the environment in other jurisdictions.
- Identifying and highlighting best practices from environment departments in other jurisdictions that can inform and guide the Ministry and the Government in meeting those challenges.

It is important at the outset to note that our study was not intended to be a detailed program or policy review of the Ministry. As such, we did not approach our task in terms of the appropriateness of various environmental policies and did not review and evaluate specific Ministry programs such as Ontario's standards for atmospheric emissions. Equally, our review was not specific to the events that took place last year in Walkerton, Ontario. These events are the subject of a separate Commission of Inquiry under Justice O'Connor.

To assist us in our work and to provide ongoing guidance, we established a central line of inquiry for the project as follows:

> ***What are the defining characteristics of and/or elements that are present in a model ministry or department of the environment?***

The responses we received and the results of our research led us to focus on two different levels of further study:

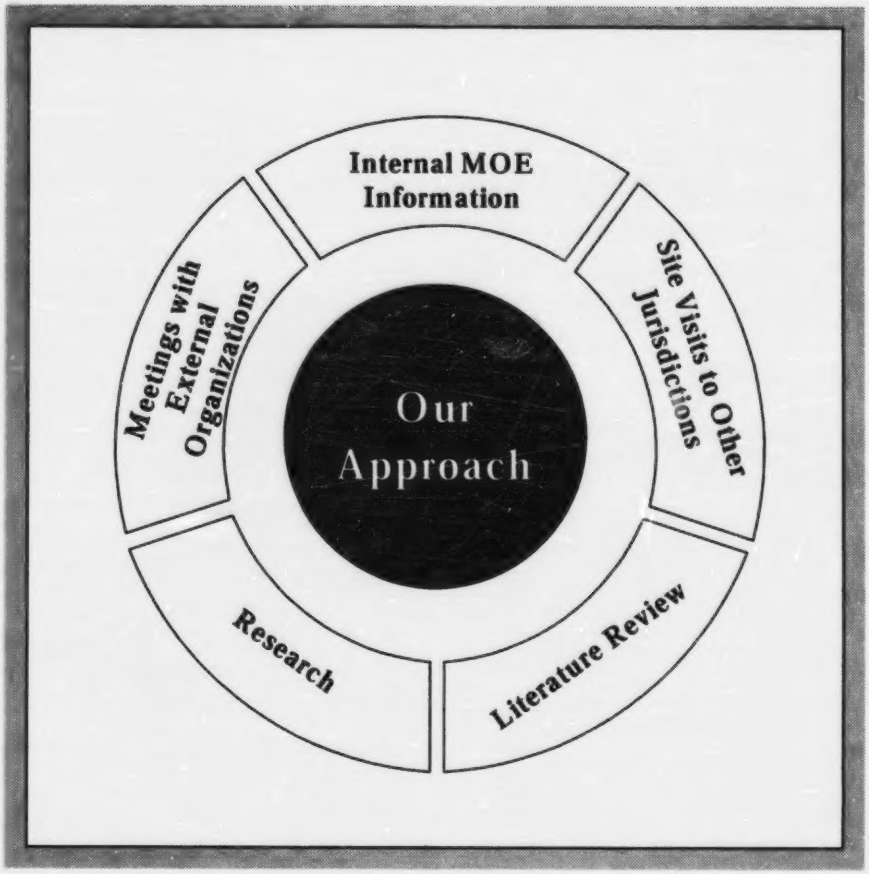
- To identify and describe what we have referred to as broad *strategic shifts* in thinking that are taking place across leading jurisdictions with respect to the complex challenges presented in the environment arena.
- Within this set of *strategic shifts*, to identify best practices and make recommendations to Government with respect to a number of key functional areas.

1.2 Our Approach

The activities undertaken as part of this project were organized into five categories as shown in the diagram on the following page.

1. Internal information gathering with respect to MOE: We met with MOE executives, staff in a number of field offices, and officials from other Government of Ontario ministries in order to:

- Establish our own baseline understanding of the current management challenges facing the Ministry.
- Obtain their input and perspectives on our central line of inquiry – the components/elements of a model ministry of the environment and related management challenges.


Internal MOE Information
Site Visits to Other Jurisdictions
Literature Review
Research
Meetings with External Organizations
Our Approach

2. ***Meetings with External Organizations:*** Our project team met with 41 external organizations:

- Representatives of the regulated community, including individual private sector firms, industry associations, and municipal representatives.
- Environmental non-governmental organizations ("NGOs") and advocacy organizations in Ontario and other jurisdictions.
- Individual environmental experts.

The purpose of these sessions was to obtain external views with respect to the management challenges currently facing MOE, their thoughts about the key characteristics and/or elements that would be present in a model ministry and the management challenges these present. A complete list of external organizations consulted with is provided in *Appendix B.*

3. Site Visits to Other Jurisdictions: Members of the project team conducted extensive on-site visits to the following selected environment departments in other jurisdictions:

- Alberta Environment, Edmonton, Alberta
- US Environmental Protection Agency (US EPA), Washington, D.C.
- California Environmental Protection Agency (Cal/EPA), Sacramento, California

In addition, we conducted telephone interviews with representatives of environment departments in the following jurisdictions:

- Environment Canada
- Pennsylvania Department of Environmental Protection
- Oregon Environmental Quality Department
- Florida Department of Environmental Protection
- New York Department of Environmental Protection

4. Literature Review: Our project team conducted an extensive survey of the literature available on the broad characteristics and critical elements of a model ministry or department of the environment and the specific functional areas included in our review. Material was retrieved from a variety of sources including: academic and other specialty publications, various documents from environment departments in other jurisdictions in North America and around the world, think tanks, and the private sector.

5. Research: Given the central role that environmental compliance assurance plays in effective environmental management, we focused considerable internal team resources on conducting and compiling extensive research in this area. In addition, we commissioned independent, external expert organizations and individuals to conduct research in critical functional areas (*see list beginning on page 36*).

The purpose of these internal and external research projects was to provide us with more detailed, expert, and independent evaluation with respect to specific best practices of interest in other jurisdictions and to allow us to expand the scope of the information and jurisdictions that could be considered.

* * *

We would like to take this opportunity to thank all of those individuals and organizations that made the time available to meet with us. Officials from Alberta Environment, US EPA, and California EPA were particularly generous in their time and efforts to accommodate us. All of the input, ideas, and perspectives were of tremendous benefit and were invaluable in the preparation of this report.

1.3 Structure of the Report

Our report is presented in two volumes as indicated in the following diagram:

Volume 1

- Strategic environmental challenges facing every jurisdiction.
- Our assessment of Ontario's current positioning.
- Analysis of the best practice information with respect to specific functions and assessment of the current Ontario context in each area.
- Set of comprehensive recommendations to Government.

Volume 2

- Copies of the external research reports prepared by independent expert organizations and individuals, as well as our project team.

Volume 1: Managing the Environment

The first volume presents the high-level and strategic management challenges facing virtually every environment department or ministry that we contacted or researched. These challenges are presented here as broad ***strategic shifts*** that are underway in how governments, regulated communities, NGOs, and the public are attempting to understand and deal with their environmental protection roles and responsibilities.

We put forward the argument in this Volume that these broad *shifts* represent significant changes with respect to current or traditional thinking and management of the environment. We also suggest that these *shifts* provide the overarching *model ministry* context and establish the *Case for Action* for the best practices that could be implemented in Ontario.

As we will describe in more detail in this section of the report, we were unable to identify any single jurisdiction that had incorporated all of the proposed elements of a model ministry. Moreover, we noted that all jurisdictions were struggling with the same issues and that individual jurisdictions were at different points along the *journey*, depending on the specific issue being considered. In this section of the report, we provide a high-level assessment of Ontario's current positioning against these strategic changes.

Also within this first Volume, we address in more detail the individual functions that we believe need to be part of a model ministry. The first of these functional areas is Compliance – what we have termed in this report *Environmental Compliance Assurance* (see Section 4.0). As we undertook this project, it quickly became apparent that a new and more comprehensive philosophical, policy, and program approach to the compliance function is a major, if not *the* major, cornerstone of best practices in leading jurisdictions. Accordingly, we devoted the largest percentage of our time and resources to this particular functional area, including discussions with other jurisdictions, experts, and preparation of a significant research report (*see Volume 2: Research Paper #1*).

The following are the other areas that are addressed:

- Governance models for environmental management.
- Knowledge Management, including knowledge creation and management, and information technology supports.

- Identifying and addressing Emerging Issues.
- Access to scientific and technical expertise.
- Environmental monitoring and reporting.
- Risk analysis, including risk assessment, risk management, and risk communications.
- Policy development.

For each function, we have identified and described the elements of the *model* approach. In each case, we have provided specific examples of selected best practices from other jurisdictions. These examples are drawn from our own research as well as the external research we commissioned. We have also included an assessment of Ontario's current positioning against the best practices information.

Volume 1 concludes with a set of comprehensive recommendations to Government for actions that could be taken with respect to the *strategic shifts*, as well as the individual functional areas. These recommendations reflect the view that the changes we have identified – policy and program changes, as well as changes in attitudes, behaviours, expectations, and roles and responsibilities – are significant and will take considerable time and resources to implement. As such, they have been developed in a manner that will provide Ontario with various starting points.

Volume 2

This volume contains the individual research papers that were commissioned as part of our review. These papers include the extensive review of environmental compliance assurance that was prepared by our team. The following is a listing of the papers and the responsible organizations/individuals:

1. Environmental Compliance Assurance: A Review of International Best Practices, *Executive Resource Group*

2. Economic Instruments for Environmental Policy Making in Ontario, *International Institute for Sustainable Development*

3. Review of Governance Models in Environmental Management, *Stratos Inc.*

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10. Risk Analysis in a Complicated World, *Dr. K.M. Thompson, Harvard Center for Risk Analysis*

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2.0 The Case for Action: *Strategic Shifts*

2.1 Introduction

A clear and compelling *Case for Action* is a critical starting point for successful and sustained change. The factors that are typically at work in this process are both *push* and *pull*. *Push* factors are usually internal to an organization and relate to a proactive effort to define what the future could look like. *Pull* factors are usually external and reflect changes or events that are taking place in the outside world, forcing change and, often, creating a sense of urgency.

The *Case for Action* for a model ministry of the environment is, by definition, focused on developments that cut across leading jurisdictions. Examining individual functions in isolation, while still yielding individual best practices, does not give one a clear sense of the broader context of ongoing strategic challenges and change. In short, in the absence of an understanding of this broader strategic context, the ***whole is not greater than the sum of the parts.***

One of our primary assertions upon completing this review is that advice on best practices that could guide changes in Ontario has to be thoroughly anchored in this larger strategic context. To that end, a part of our research focused on identifying what we refer to throughout our report as the high-level *strategic shifts* in environmental management that are generally recognized by most, if not all, jurisdictions, and that are being addressed by leading jurisdictions in particular.

Throughout the course of our research, we found a striking consensus about the changes in mainstream environmental thinking that cut across jurisdictions. This new thinking incorporates major changes in how governments, the regulated community, NGOs, and the public are attempting to deal with contemporary environmental challenges. The California Environmental Protection Agency has described the challenge in this way:

> *New more complex challenges face us at the dawn of the 21st century. We achieved many of our past gains by focusing on the largest and most obvious*

> *sources of environmental problems. We established and enforced requirements that prescribed not only the results but also how they were to be achieved. As we look forward, we must fundamentally alter our approach to environmental protection. This strategic vision aims to match our past success by developing new strategies rooted in our understanding of the causes of environmental problems. (Cal/EPA Strategic Plan 1998-2000)*

In this section of our report, we will explore these *strategic shifts* in more detail, describing their basic elements and interconnectedness, as well as identifying the essential differences with more traditional and limited approaches.

From our perspective, these high-level *strategic shifts* are the critical underpinning of our review. They form the essential strategic backdrop for our subsequent discussion of best practices in individual functional areas that could be applied to Ontario. They represent the broader management context that all jurisdictions need to address as part of developing model environment ministries or departments.

While traditional concepts and models of environmental protection have had some notable successes over the past 20 to 25 years, there is a consensus that they have, as stand-alone approaches, reached the limits of their effectiveness. As our understanding of environmental challenges has increased in complexity, it becomes clearer that governments, the regulated community, NGOs, and the public need to work together in new ways to identify innovative approaches that will address these complexities.

Having said this, no single jurisdiction has completely or successfully made the transition. While most have acknowledged in one form or another the need for change, each is struggling with how best to make the transition. As a result, individual jurisdictions are at different stages with varying degrees of success in what is, in effect, a continuum of change.

In creating the framework of *strategic shifts*, we acknowledge that there is considerable overlap and interdependency in the various shifts. Conceptually and in practice, they need to be viewed as a fully integrated approach that is reflected in strategic direction setting, policy and program development, and delivery. However, we felt that it was important to portray them separately here to ensure clarity of the underlying ideas. The following provides a summary of the *shifts.*

From a Traditional Regulator	***Towards a strategic approach to Managing the Environment.***
1. One ministry having sole responsibility for environmental protection	*A high-level, government-wide vision and goals with implementation shared across different departments*
2. A primary emphasis on ensuring compliance with minimum standards for large stationary facilities	*A new and broader emphasis on strategies to promote continuous improvement in environmental outcomes and accountability across all sources of pollution*
3. Traditional program delivery according to municipal or ministry/department area or region boundaries	*A place-based approach with boundaries that make environmental planning sense and facilitate a total cross-media, cumulative approach (such as watershed management)*
4. A primary reliance on traditional investigation, enforcement, and abatement tools	*A more comprehensive, flexible set of regulatory and non-regulatory compliance tools and incentives*
5. A reliance on government to do it all	*An approach based on shared responsibility with the regulated community, NGOs, the public, and the scientific/technical community*

2.2 An Overarching Strategic Shift

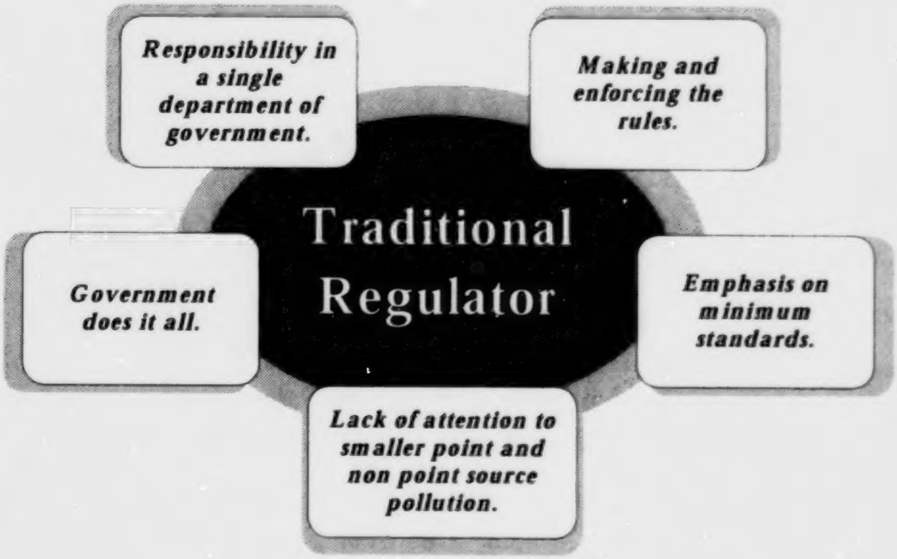
The first and most important *strategic shift* – which we characterize as overarching – sets the stage for the larger pattern of shifts:

Overarching Shift

Towards a strategic approach to Managing the Environment.

The Traditional Model

The traditional approach to environmental responsibilities in many jurisdictions relies primarily on implementing and enforcing regulations and standards to restrict pollution activities. The defining elements of this approach (*see diagram below*) include:


Responsibility in a single department of government.
Making and enforcing the rules.
Traditional Regulator
Government does it all.
Emphasis on minimum standards.
Lack of attention to smaller point and non point source pollution.

- Government makes and enforces the rules; the regulated community follows the rules.
- The rules are mainly minimum standards directed at large, stationary point source facilities (i.e. large *stacks and pipes* and municipal facilities). Enforcement focuses primarily on these minimum standards.
- Limited attention is paid to significant but more difficult and diffuse sources of pollution, i.e. smaller point and non-point sources.
- The emphasis is on government as the *sector of choice* for solving most or all environmental problems, including direct delivery of all of the major components of environmental protection such as standard setting, monitoring, inspection, enforcement, etc.
- Limited public involvement in the process and limited public access to environmental information and data.
- An emphasis exists within government on a single ministry or department of the environment having the primary or even sole policy and program delivery responsibility and accountability to protect the public and environment.

Limitations of the Traditional Model

Leading jurisdictions acknowledge the inadequacy of this traditional model – often described as *command and control* – as the *primary* or *stand-alone* approach in terms of dealing with the changing and increasingly complex environmental challenges of today and the future. These jurisdictions point to the following:

- The emphasis to date on large point source pollution has been pushed as far as possible. In many cases, new *end of pipe* technology is yielding decreasing/marginal environmental benefits at increasingly high costs.
- Today's issues – for example, smog, global climate change, increased respiratory illnesses – are much more complex in terms of causes, interactions, and their impact on human health, quality of life, and/or the environment. As such, they require more complex, partnership-

based solutions in addition to simply *set the rules, follow the rules*, based on minimum standards.

- Developments in scientific and risk analysis indicate more clearly than ever that the effects of pollution on land, water, and air, and ultimately human beings are not separate and discrete. Large, small, and non-point source pollution cuts across all media (air, land, and water), is cumulative in nature, and needs to be viewed and dealt with as such.
- There is growing acceptance that government cannot *do it all.* There are simply not enough resources in any jurisdiction to regulate everything, assuming that traditional regulation could even be an effective strategy for dealing with smaller point and non-point source pollution and addressing today's more complex and cumulative health and environmental problems.
- Governments have a better understanding that the *single department* approach does not lever all of the energies and resources of government in dealing with complex problems. This is particularly true where ministries or departments have real or perceived conflicting mandates or advocacy roles on behalf of client groups, i.e. agriculture, industry, forestry, fisheries.
- There is increasing awareness that an informed public, with access to environmental information, including performance information, can be an effective tool in achieving environmental goals.

Moving to the Next Level

In light of these inadequacies, leading jurisdictions are actively engaged in trying to move to the next level of dealing with the environment, sometimes referred to as a new vision of *environmental management.* This new vision clearly builds on the strengths of traditional regulation and the command and control model, but also integrates it with a broader, more comprehensive approach.

This broader approach builds on and steps beyond minimum standards to emphasize continuous improvement for all sources of pollution, cross-media and cumulative impacts, and broader public participation and access to information. It typically includes less overall emphasis on the role of government as *doer*, i.e. protecting human health and the environment by traditional regulation and enforcement, and a greater emphasis on the role of government to provide overall *system management* through a range of partnerships, processes, structures, and tools including:

- Establishing a clear government vision with priorities and expected goals/outcomes for human health and the environment that take into account concepts such as continuous improvement, cumulative impact, and performance-based management.
- Setting standards that are backed up by tough and effective enforcement that distinguishes between good and bad performers.
- Providing flexibility to system partners to develop mechanisms and tools that will allow them to more effectively and efficiently meet or, ideally, to exceed standards and goals.
- Establishing a climate of partnership based on an understanding of what it means to *manage* the system as opposed to *own* all of the activities and to include broad participation and input into planning and priority setting.
- Establishing frameworks and mechanisms for delegating/sharing responsibility with others (i.e. the regulated community, NGOs, and the public), including ensuring that knowledge and information is available in forms that can be readily used and understood.

Most of the leading jurisdictions we considered had articulated some version of this transition to Environmental Management in their strategic plans or other comparable documents. *Appendix D* is a good example, drawn from the New Jersey Department of Environmental Protection's 1998-2000 Strategic Plan.

2.3 Other *Strategic Shifts*

Consistent with the overarching ***strategic shift*** towards ***Environmental Management***, we have isolated a number of these approaches, or ***strategic shifts***, that are being pursued by leading jurisdictions. Again, these are summarized on page 13.

Strategic Shift #1

Towards a high-level, government-wide vision and goals with implementation shared across different departments.

In many jurisdictions, the primary responsibility for the environment has been delegated primarily to one department of government. This outlook is consistent with what we identified earlier as the traditional approach to environmental protection – the ***command and control*** and ***end of pipe*** orientations, focused on minimum standards and regulation for major point source polluters.

In our discussions with other jurisdictions, we learned that it is not uncommon for relatively isolated environment departments to experience difficulty in gaining support from other related government departments – for example, agriculture, natural resources/lands and forests, transportation, economic development, finance, and municipal affairs. In effect, environmental goals are often viewed as ministry or department goals for the environment, rather than governmental goals.

In some cases, the other departments try to stay neutral in what they view as a struggle between the regulator (the environment department) and their clients in the regulated community. In the worst case, an adversarial system emerges within government where other departments actively seek to moderate or minimize the impact of environmental regulations on their clients.

However, governments and others are beginning to recognize that the challenge of effective environmental management is broader than the traditional environment department or ministry. There is a growing awareness that the solutions can only be achieved by marshalling and aligning all of the resources of government to achieve a common purpose.

Developing the capacity to deal with the various strategic shifts we have identified in this report requires a more comprehensive and sophisticated government strategy that:

- Establishes a clear environmental vision for the government as a whole rather than for one or two departments.
- Sets out clear priorities with measurable goals and objectives – not just for reduced emissions, but also for sustaining human health and the environment and ensuring balance with a strong economy.
- Includes high-level strategies consistent with the vision and measurable goals, that cut across government departments and other jurisdictions and that engage the regulated community, NGOs, and the public.
- Establishes a strong central capacity for coordinating efforts, ensuring consistency with the vision, and monitoring performance and effectiveness.

Norway and Sweden are two examples of governments that take this more comprehensive approach to setting high-level goals that are first enshrined in law and then translated into more specific goals and performance targets for individual departments. In the Swedish example, the goals speak to more than just targets and discharge standards. Sweden establishes the admirable, if ambitious, goal of becoming environmentally sustainable within one generation. The goals of this jurisdiction also speak to the way in which environmental policy should be conducted and, in doing so, determines the system of environmental management that is required.

Alberta has also signalled its intention to move in this direction. That government's Commitment to Sustainable Resource and Environmental

Management, signed by the Premier (a former Minister of the Environment), sets out a high-level, government commitment to environmental management that is integrated with the province's major themes and priorities. It is applied across "departments, boards, and agencies" and defines four lead ministries – Environment (which in Alberta also includes Lands and Forests and Natural Resources), Agriculture, Food and Rural Development, Energy, and Economic Development.

In contrast, US EPA has recognized the need for greater integration across government agencies but has to deal with a very fragmented and prescriptive legislative framework that is seen as limiting more formal cross-agency/department mandates. In the absence of this mandate, US EPA has called for a more voluntary approach – what it calls "a framework for collaboration".

Strategic Shift #2

Towards a new and broader emphasis on strategies to promote continuous improvement in environmental performance and accountability across all sources of pollution.

Continuous improvement across all sources of pollution is a critical component of an effective environmental management approach. In general, emissions can be categorized in three ways:

- *Large point source emissions:* Generally those that can be traced to or identified with a particular facility or part of a facility. Large point source polluters are usually easily identifiable – most commonly the larger industrial and municipal facilities – also known as ***stacks and pipes*** and large waste sites.
- *Small point source emissions:* Emissions associated with the tens of thousands of smaller industrial and business facilities, which may or may not be known or identified such as autobody shops, gas stations, small metal plating companies, photo finishers, dry cleaners, etc.
- *Non-point source emissions, including naturally occurring effects:* These are wide-scale pollution sources that are diffuse and do not have a single point of origin or are not introduced into the receiving media from a specific outlet. These forms of pollutants are generally carried off the land by storm-water runoff:
    - Agricultural run-off including pesticides and fertilizers.
    - Urban run-off including pesticides, fertilizers, oil, grease, toxic chemicals, and storm water/sewer overflows.
    - Mobile sources, i.e. motor vehicles.
    - Sediment from improperly managed construction sites, mineral resource extraction, agricultural and deforestation, and eroding banks and shorelines.
    - Bacteria and nutrients from livestock and faulty septic systems.

Traditional environmental regulation has been focused on the relatively narrow front of ensuring compliance with minimum standards, set and targeted primarily at large stationary point source polluters and managed separately for air, water, and land.

Although this approach has served us well over the years, there are a number of recognized limitations in terms of its usefulness in addressing increasingly comprehensive and complex problems:

- The emphasis on large stationary point sources of emissions misses the significant areas of smaller point source and non-point sources.
- In most industrialized nations, minimum standards tend to be oriented towards the lowest common denominator. As one jurisdiction put it: "Minimum standards lead to minimum environmental quality".
- Economic growth, including increased volumes of industrial activity, growing populations, and expanding urban development, means that overall environmental loading is increasing rather than decreasing. The traditional focus on minimum standards for individual facilities means that many of our more significant and severe environmental problems – global climate change, smog, ozone layer depletion – are getting worse or are not improving at an acceptable rate.

This does not mean that most jurisdictions have achieved 100 percent compliance for large stationary point source polluters or that there is no room for improvement. However, the necessary components of this type of regulation are generally already in place:

- Virtually all of the major *stacks and pipes* have been identified and significant reductions and improvements have been achieved.
- Although some challenges remain, the foundation of science-based standards, permitting processes, and monitoring, inspection, and enforcement has been established.

Building on the success of past approaches, and in response to new challenges, leading jurisdictions are turning towards the next-level of environmental management. This includes fostering a culture of *continuous* *improvement* – the public expectation that, over time, environmental conditions and the performance of the regulated community must continue to improve, as opposed to worsen or maintain existing levels. Furthermore, these jurisdictions recognize that the goal of continually improving environmental conditions is not another new program on top of existing ones. Rather, it represents a change in philosophy for how governments undertake their responsibilities.

In moving towards environmental management based on continuous improvement, it is important to note that this direction reinforces the need for a foundation of tough, aggressive enforcement using a full range of tools including administrative and court-based penalties. It also does not mean that attention is no longer paid to major point source polluters. As discussed in Section 4.0 of our report (*Environmental Compliance Assurance*), leading jurisdictions are supplementing these approaches, for example: adopting tiered cooperative agreements that are directed not only at continuous improvement, but also at cross/multimedia. The uses of these agreements include full transparency in terms of monitoring to achieve agreed upon goals.

Strategic Shift #3

Towards a place-based approach with boundaries that make environmental sense and facilitate a cross-media, cumulative approach (such as watershed management).

The traditional approach in many jurisdictions is to organize and carry out their activities using approaches that do not necessarily make environmental sense. Typically, this means:

- Regulating primarily in terms of distinct media – i.e. separately for air, water, and land.
- Planning and delivering environmental protection programs based on the geography of local municipalities or government regional or area offices.

For all of the success enjoyed in the past by this traditional approach, leading jurisdictions have recognized that it works against dealing with contemporary environmental challenges such as continuous improvement across all sources of pollution. It also works against adopting approaches that deal with potential long-term impacts on humans and the environment, for example:

- The problem of acid rain has diminished over the past decade or more. There is, however, evidence that many of North America's lakes, rivers, and streams are continuing to acidify and deteriorate in other ways.
- Toxic wastes discharged into the Great Lakes have been substantially reduced and yet serious concerns remain about the quantity and quality of fisheries and contamination from air pollutants, often from across provincial or national boundaries.
- Global climate change and smog continue to threaten human and environmental health around the globe.

- Moving beyond reacting to catastrophic events such as species on the brink of extinction or a development-related devastation of a natural habitat and towards preventing these occurrences.

An acknowledgement of these challenges and the development of strategies to address them is a characteristic of leading environmental jurisdictions. Our research indicates a strong consensus with respect to the need to develop ways to deal with the environment in a manner that *integrates across media* and deals with the *total cumulative impact* of pollution on people and places.

Total cumulative impact, for our purposes, can be defined as the total loading of emissions and discharges from all sources of pollution – large, small, and non-point source – as a result of past, present, and anticipated future actions on humans and nature. As the US Council on Environmental Quality has phrased it: "*Evidence is increasing that the most devastating environmental effects may result not from the direct effects of a particular action, but from the combination of individually minor effects of multiple actions over time*". The Council goes on to say that the fact that environmental conditions continue to change in unwanted or unintended ways in spite of government regulation is largely attributable to this incremental and cumulative impact.

The alternative to the traditional approach is to recognize the fact that the natural environment has its own ecological and biophysical boundaries. To be sure, they are not simple boundaries but they do reflect environmental – and human – realities. This alternative is called *place-based* environmental management.

Place-based environmental management puts the emphasis on geographic convergences of water, land, and air – in short, places where people live, breathe, eat, and drink water. They are where large and small point source facilities, and non point sources are located.

Our research and discussions with other jurisdictions indicates consensus that *watersheds* are an appropriate basic organizing principle for place-based environmental management. Simply defined, a watershed is comprised of the land drained by a river and its tributaries. There are also subwatersheds that are comprised of the land drained by an individual tributary to the main watercourse.

The watershed approach is best developed because they are reasonably easy to define and remain relatively fixed over time. Also, problems with non-point source pollution are closely associated with land/watercourse conduits and run-off patterns, including urban and agricultural run-off. As one US official succinctly put it: "Everyone lives downstream from someone else".

The challenge most people point to, when discussing a watershed approach, is that narrowly defined it only deals with land and water. For air, the corresponding concept is the *airshed*, and almost without exception, the boundaries of airsheds are larger and more amorphous than those of watersheds. Having said that, the long-term challenge has been to find ways to build on the advantages of the watershed and to monitor, collect and manage information that supports decision-making across water, land, and air.

To date, no single jurisdiction has had complete success in developing the data, complex models, and other analytical tools required to achieve this integration. However, US EPA is one example of a jurisdiction that has made considerable progress since the early 1980s through its innovative Chesapeake Bay Project. The purpose of this long-term project has been to develop the ability to conduct cross-media assessment and integrated air and water management for the Chesapeake Bay area, through the integration of air and water quality models. The project's focus has been on nutrient sources of pollution (e.g. nitrogen, phosphorus). *Appendix E* provides more details with respect to the Chesapeake Bay project.

In the long-term, the intention is to incorporate other pollutants and apply the models to other watersheds and corresponding airsheds. Also in the future are plans to develop the mapping capacity, data, and modeling for integrating ground water/aquifer information.

Clearly, adopting a *place-based/watershed* approach requires a number of new and different structures and processes as well as significant changes in how governments, along with the regulated community, NGOs, and the public work together to achieve the following goals:

- Establishing ecological boundaries that are flexible in terms of size and scope – what MOE has called a "hierarchy" of overlapping sizes. Places such as watersheds can be measured and mapped with reasonable precision and are both big and small. The Great Lakes Basin is an example of a very large watershed. The Credit River Valley in Ontario is an example of a much smaller watershed. Ideally, environmental management would take place at both levels and would be integrated and complementary.
- In most jurisdictions that are implementing a watershed approach, the efforts are very much *bottom up* in nature, drawing heavily on local participation and, in some cases, local agencies with delegated responsibilities. Australia, for example, has established local Catchment Management Authorities that are responsible at the watershed level for planning, assessment, implementation, and monitoring. Likewise, Washington State, through its *Watershed Planning Act* established a locally based and collaborative watershed planning and management framework.
- Working with local publics and the regulated community to establish goals for each *place* that take the form of agreed upon or "designated" public uses/activities for the various resources within its boundaries, i.e. drinking water, fishing, swimming, recreational boating, agriculture, industrial and urban development. The US Clean Water Act, for example, is based on the premise that it is not realistic, or necessary to say that all waterways will be clean to the same degree and will be available to society for the same uses, i.e. drinking, swimming, fishing, and recreational boating.
- Establishing the maximum amounts (*total cumulative load*) of pollution from all sources (including point, non-point and naturally occurring) that can be allowed in that area over a specific period consistent with achieving the goals that were set. This would be based on monitoring, basin-wide planning, remedial strategies, and basin-wide permitting.

- Defining what is a truly *meaningful* environmental effect, i.e. the point at which a resource is no longer *significantly* affected.
- Ensuring transparent public access to as comprehensive as possible a range of information and data. The US EPA and other jurisdictions have made this information available to the public in ways that challenged our thinking. For example, US EPA maintains a web-site (www.epa.gov/surf/) that provides the public with information about the total maximum daily load (TMDL) allowed in watersheds across the country as a way of helping citizens to assess their local quality of life and supporting them to be informed participants in local decision-making. Based on the size of the allowable load, the watersheds are colour-coded to correspond to a quality index, red representing the most serious problems, and green representing the least. With a simple mouse-click, an interested citizen can obtain similar information about the air quality affecting that watershed, and, depending on the state, can obtain state environmental permitting information, violation/compliance, and remediation plan information for specific facilities (see *Appendix F* for an example from the Pennsylvania Department of Environmental Protection).

Strategic Shift #4

Towards a comprehensive, more flexible set of regulatory and non-regulatory tools and incentives.

Traditional compliance emphasizes inspection, abatement, investigation, and enforcement. The focus is typically on approvals and enforcing compliance with minimum standards for larger, stationary point source polluters. Environmental thinker Donald Kettl in 1998 described this as a *first generation* environmental strategy. The fact remains, however, that the major advances in traditional *end of pipe* regulatory tools have largely already been made. In many cases, end of pipe technologies are at a point of diminishing returns, i.e. significantly increased cost for progressively marginal benefits.

The current leading thinking is that our complex environmental problems require more collective solutions including broader participation, changes in behaviour, and cooperation among all stakeholders and across jurisdictions – what Kettl refers to as *second generation* environmental strategies. These more evolved strategies go beyond government dictating what industry must do within a command and control model. They also recognize that the more purely voluntary side of pollution prevention has already been taken to the limits of its effectiveness. The US EPA's Office of Research and Development describes this development as follows:

> *As P2 [Pollution Prevention] implementation has advanced in the past ten years, many of the problems most easily addressed by using a preventative approach have been solved. Although progress in P2 over the next ten years may not proceed as rapidly as in the past, the results can be even more significant...will represent more fundamental changes in individual lifestyle, industrial process design, consumer products and land use. Future R&D must focus on quantum leaps instead of incremental improvements. These advancements will not be achieved without a commitment by the public and private sectors....*

The emerging direction is much more *performance*-based, rather than *rules*-based, with a greater emphasis on government's role to set outcomes and then work with the regulated community to determine how best to meet them, including:

- More emphasis on partnerships with industry sectors, NGOs, and communities.
- Greater emphasis on innovation and flexibility as long as the performance goals are being met, including more cooperative agreements, streamlined processes, multimedia permits, and emissions trading just to name a few.
- More emphasis on compliance assistance to help firms comply with regulation. This approach arises from an improved understanding of why firms fail to comply with regulations. Consistent factors in non-compliance include: ignorance of regulatory requirements, inadequate knowledge in the organization of its own operations, poor internal environmental management systems, and an inadequate internal capacity to comply. Many jurisdictions, including the US, Australia, and Canada, have introduced substantial compliance assistance programs aimed at information, training, and providing technical assistance.
- Finally, there is also much greater emphasis on applying this range of flexible tools to deal more directly and effectively with non-point source emissions.

This new approach is often referred to as an *integrated compliance assurance* strategy. Its essential components include:

- Acceptance of the position that working towards alternatives to traditional regulatory enforcement does not mean a weakening of environmental protection, but is rather a necessary enhancement to address environmental problems and achieve environmental goals of greater complexity within an overall commitment to environmental management.
- The idea of a compliance assurance tool kit – a set of instruments, both regulatory and non-regulatory – that in the proper combination will allow societies to achieve their goals not just for minimum

compliance, but for continuous improvement. Today's tool kit would include the broadest range of instruments from compliance assistance, cooperative agreements, economic instruments and other incentives, to inspections, abatement, investigation and enforcement.

- A clear understanding that a strong, effective, and very tough inspection, investigation, and enforcement function (the core of the old *command and control* approach) that makes full use of administrative and court-based penalties is the essential backbone for the new tool kit. A 1998 study in this area noted that: "Absent the plausible threat of enforcement, cooperative approaches to achieving compliance seem to have only limited effect on regulated entities." A study of large industrial facilities in British Columbia reached the same conclusion – that the fundamental factor supporting the adoption of best management practices was strong enforcement.
- A recognition that the long-standing and polarized debate about *regulatory* versus *voluntary* reflects outdated thinking and often serves to divert attention and energy away from change and new approaches.
- An understanding that the term *voluntary* does not accurately describe the currently available range of non-regulatory compliance and continuous improvement initiatives that makes up successful and integrated compliance assurance strategies. These initiatives include a complementary mix of education and outreach, mandatory self- and externally-validated monitoring, positive and negative recognition, public pressure as a result of transparent public access to performance information and involvement in local decision-making, market and other incentives, binding cooperative agreements, and tough enforcement of minimum standards.
- Acceptance that in some cases, the responsibilities to implement can be delegated to or shared among levels of government, the regulated community, or third parties (i.e. accredited external auditors).
- Understanding that the process of developing integrated compliance strategies is relatively new and quite complex and raises debates about many difficult issues, including the following:

- It requires change to an approach that has become quite comfortable for governments, the regulated community, NGOs and the public.
- It involves creativity, innovation, and the risks associated with experimentation.
- It requires a degree of inclusiveness and public transparency and disclosure that may be unprecedented in some jurisdictions.
- It raises issues of equity, level playing fields, and commercial competitiveness.

New Jersey, for example, has publicly committed to a "new regulatory framework (that) will feature…integration of pollution prevention strategies into the mainstream of permits and regulations". Massachusetts, through its *Environmental Results Program*, provides for whole facility self-certification with performance based targets, and involving government inspection. Environmental officials note that this has the important benefit of allowing them to refocus resources on other environmental priorities. Currently, this approach is being used to address hard-to-regulate smaller point source pollution in three sectors: dry cleaning, photo finishing, and commercial painting.

This is a relatively new area of thinking for the environment. As with any new area, there is a certain amount of controversy. It is important to note, however, that in this case, the controversy is not about whether to go down this path – leading jurisdictions have determined that this is imperative – but rather which tools to use along the way. As US EPA has phrased it:

> *We know that a wide variety of environmental strategies – both regulatory and non-regulatory – are possible. The greatest challenge in the future will be to select among all the options available to design the most effective response to existing and emerging environmental problems.*

An integrated compliance assurance strategy would draw an instrument from the tool kit, or combination of instruments, to achieve a policy end. The justifications for how the choice was made could be evaluated according to a comprehensive matrix of criteria. While the goal is to maximize compliance flexibility for all parties, the basic premise is that the end determines the appropriate means. Simply put, compliance assurance is about ***finding the right tool to do the right job.***

Strategic Shift #5

Towards an approach based on shared responsibility with the regulated community, NGOs, the public, and the scientific/technical community.

Traditionally, industry and the public have defined environmental protection as almost exclusively the government's responsibility – establish standards, issue approvals, collect information, inspect and enforce. This narrow approach has been successful to a point; however, as our understanding of the broader challenges associated with environmental management – as opposed to the more limited conception of environmental protection – continues to grow, there is a recognition that *governments alone* do not have the resources to do it all, nor is it the most effective approach.

In a model jurisdiction, the approach is one of shared responsibility and partnership through cooperation among stakeholders. Most often, this is achieved through a few key mechanisms, for example:

Delegating responsibility (not necessarily accountability) for some activities to other partners or levels in the system.

- Our discussions indicate that there is substantial support within the stakeholder community in Ontario and elsewhere for this kind of change, although not everyone is supportive.
- For some advocacy organizations, industry will always continue to be the *bad guy* and not capable of being a trustworthy partner in effective environmental management. Others we spoke to in industry continue to take a very narrow view of their own and government's responsibility. Comments were made along the lines that "they make and enforce the rules and our job is to follow them or get punished". The point, however, is not whether they are right or wrong; rather it is how to move beyond these perspectives to a new way of doing business.

- The range of examples from other jurisdictions for how to accomplish this includes:
    - Networks of multistakeholder external advisory bodies, i.e. discussion groups, councils, roundtables, etc. to develop issue understanding, explore policy options, and develop pilot initiatives.
    - Local bodies to plan and set priorities within federal, state, or provincial frameworks, policies and priorities.
    - Locally managed assessments and/or approvals.
    - Allowing the regulated community – within clear accountability and verification requirements – to undertake its own routine monitoring and reporting, including the use of self-certification and third party audits as allowed in Massachusetts and New Jersey.
    - Funding NGOs to take an active role in policy development and monitoring activities.

Transparent sharing of information with the public.

- The message from many jurisdictions is that sustained poor environmental performance (as opposed to one-time incidents or errors) within the regulated community has to be viewed as first and foremost a form of bad behaviour. Behind this bad behaviour, there are very often serious issues with organizational and environmental values.
- Recognizing this fact, many jurisdictions are turning to the public as a critical lever in promoting better environmental practices and continuous improvement. Transparent public reporting programs are increasingly real time and Internet-based. In Pennsylvania, for example, programs include facility-specific information about permits, current loading, and compliance records (see *Appendix C* for Pennsylvania example).
- The indications are that public pressure and stigma can be very effective:

  - In some jurisdictions and sectors, public pressure and, in particular, local pressure, based on access to environmental performance information, has been used very effectively with poorly performing members of the regulated community as part of ensuring compliance with minimum standards.
  - Transparent public reporting is felt to play a key role in driving the transition of companies, industries, and economies towards the ultimate goals of continuous improvement and sustainable development.
  - In other circumstances, the public's ability to compare polluters that are only meeting the minimum standards with those that are actually exceeding standards, has contributed to continuous improvement.

- Market forces/consumer expectations are one of the key drivers for moving in this direction. A number of sectors – most notably the chemical producing sector – have already determined that environmental reporting is part of what their customers demand and expect. They have the view that satisfying the demand is ultimately good for business. These sectors remain, however, exceptions rather than the rule.

- The regulated community's desire for greater regulatory flexibility and an expanded range of environmental management tools such as self-monitoring and external auditing, life cycle assessment, and full cost accounting comes at a price. That price is widely acknowledged to be greater environmental reporting. Our discussions with industry sectors that are considered environmental leaders, such as the chemical producing sector, suggest that these leaders already understand this connection.

- Finally, public participation in the process and, therefore, transparent public access to a broader range of environmental information is essential to successfully making the transition towards a more strategic approach to environmental management that incorporates leading concepts such as continuous improvement, total cumulative load, and place-based planning and delivery.

Most of the leading jurisdictions we examined in our research clearly recognize who their stakeholders are and the need for, and the value of, their participation and input. These organizations have moved or are moving beyond the entrenched *us* versus *them* approach, i.e. *this is our position, what do you think* approach to one of *we don't have all the answers.* New Zealand and the Netherlands are examples of jurisdictions that are engaged in efforts to increase participation in particular in the policy making phase of environmental management. More broadly, the State of Oregon has in place a process for the participation of local advisory councils in the development of statewide strategic directions and their implementation at the local level.

3.0 The Ontario Ministry of the Environment

3.1 Introduction

As discussed at the outset of our report, the origin of our review was the Government's stated commitment to establishing Ontario as a leading environmental jurisdiction and as a model in future for other jurisdictions to emulate. The purpose of this section is to provide a high-level assessment of the current status of MOE against the *strategic shifts* that were identified and discussed in the preceding section as essential characteristics of leading or model environmental jurisdictions.

In developing this analysis, we:

- Had meetings and discussions with the Ministry's senior management team, individual executives across the Ministry, and a selection of regional and district office managers and staff.
- Reviewed a wide range of Ministry documents, including business plans, policy papers, and program descriptions.
- Sought input from a selection of former Ministry officials and officials in other government departments.
- Solicited views from a wide range of external organizations and interest groups.
- Incorporated our learning and lessons from discussions with other jurisdictions.

3.2 Personal and Professional Commitment

Ministry officials ought to be recognized for their evident personal and professional commitment. As we met with officials at all levels in the organization, we were impressed by the intensity of this commitment directed at the ideals of high quality public service. We also witnessed a strong personal and professional commitment – in many cases, life-long – to the environment and an acute awareness of the critical role its effective management plays in each of our lives.

At the same time, we witnessed an organization under considerable management and operational pressure, as the Ministry makes every effort to balance the requirements of the day-to-day running of its business and programs for the public, with the extraordinary circumstances of recent months. In addition to our review, the latter included: the greatly heightened public awareness of and attention to environmental issues, the operational challenges associated with remediation in Walkerton, Ontario, and the Ministry's participation in the current Commission of Inquiry and police investigation.

Notwithstanding these challenges, it was clear to us at all times that the officials in the Ministry approach their responsibilities with an admirable passion. We were very pleased and gratified by the time and thoughtfulness that individuals dedicated to our process and to our discussions with them.

3.3 Overall Conclusions

As indicated in the previous section of this paper, our essential conclusion is that the major environmental management issues facing the Ministry and the Government are not primarily administrative in nature. Rather, they relate at a higher level to how the Ministry and the Government are positioned to respond to the *strategic shifts* currently underway to varying degrees in leading jurisdictions and that are critical for responding to future challenges.

We have also concluded that these challenges are, in general terms, the same for each of the jurisdictions that we looked at and, based on our research, most if not all of the industrialized nations in the world. Furthermore, we concluded that each jurisdiction is at a somewhat different starting point on this journey in terms of comprehending and undertaking the various *shifts*.

However, there is a consensus among leading jurisdictions that the decision to move ahead must be taken. In fact, this preparedness to publicly articulate a measurable vision for the future and to commit to making the journey is one of the key distinguishing features of a leading jurisdiction. Alberta, Sweden, US EPA, and California EPA are examples of where this has been the case.

Turning specifically to Ontario, we would not characterize the overall direction of MOE and environmental protection in Ontario as leading. Although building blocks are in place in a number of areas, overall the impression is one of a somewhat piecemeal approach. It is also apparent to us that Ontario is not only behind the progress being made in other jurisdictions in terms of the *strategic shifts* identified earlier, but also that the *gap continues to widen.* Our assessment is that without a concerted and strategic effort on the part of the Government and the Ministry, the stated goal of establishing Ontario as a model for others may not be realizable.

3.4 Awareness of the Strategic Context

Whenever we met with Ministry officials and external organizations and individuals, we asked the same question: *What do you think are the elements of a model ministry or department of the environment?*

Almost without exception, participants began their responses at a strategic level. As a group, the Ministry's senior management team and individual executives, as well as most representatives of external organizations, demonstrated a strong awareness that traditional models of environmental protection, however effective in the past, have been pushed as far as possible.

Participants described the evolution of a general public, regulated community, and NGOs to a more sophisticated understanding of the complex linkages and interrelationships associated with environmental issues. They also noted that the current and future environmental issues are more diffuse, complex, wide-scale, and ultimately intractable than *stacks and pipes.* They concluded – as have we in the course of this review – that solutions to these problems lie in new, more integrated and comprehensive approaches and philosophies, established firmly on the foundation of past success.

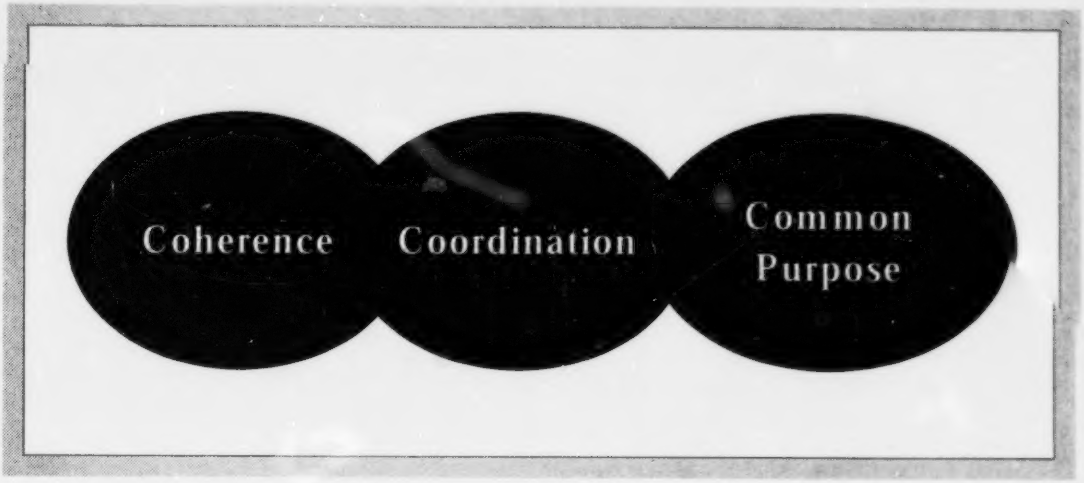
In our discussions, we saw evidence of a genuine MOE effort, despite the challenge of day-to-day pressures, to monitor and stay abreast of developments in other jurisdictions. More importantly, we witnessed an awareness of the broader developments – the *strategic shifts* – in environmental management that are underway in other industrialized nations.

Among Ministry executives and most external organizations, there appeared to be strong support for moving in these directions – in essence, towards more integrated, strategic management of the environment. This support reflects a consensus that this step is, in fact, the natural next stage in the evolution of traditional approaches. MOE officials recognize both the public policy and environmental merits of the new approach.

3.5 Need for A Coherent Strategy

While the general awareness in the Ministry of the *strategic shifts* underway in environmental management bodes well for the future, our review suggests that one of the single biggest issues facing MOE and the Government is the absence of a vision for the future of environmental management in Ontario that addresses the various *strategic shifts*.

As stated elsewhere, the purpose of this vision is not only to bring coherence to MOE's internal efforts, but also to provide for greater coherence and more effective coordination towards a common purpose across all affected Government ministries and agencies.



Having listened to a consistently articulated, if somewhat informal, vision for the future in our various discussions with Ministry and external participants, we were struck by the seeming lack of progress within the Ministry and beyond towards articulating this vision more fully and developing the political and public consensus, including policy, program, and organizational options, to make it more of a formal reality.

A contributing factor has been the reality of public service in Ontario and elsewhere over the last decade or more. This reality is characterized by significant rethinking of the role of government, major restructuring of government services including redefining core businesses, and major reductions in the overall size of government. Another factor is the relatively high turnover of leadership during this time, including ministers, deputy ministers, and assistant deputy ministers. Our experience suggests that these factors combined – not only in MOE but in other Ontario ministries and other jurisdictions as well – make it very difficult for any organization to focus on long range thinking and planning.

Given this, our overall impression of MOE is one of:

- A Ministry aware of the need for change, aware in fact of the changes that should be made, but uncertain and unsure of whether and how best to proceed in the absence of a clear political and public consensus.

- A core of the Ministry firmly entrenched – philosophically, culturally, and programmatically – in a traditional ***command and control*** approach.
- Examples of leading initiatives emerging from various creative centres in the organization that do not fundamentally challenge the precepts of traditional ***command and control*** and that tend to represent an overlay on this approach, as opposed to a truly new way of doing business.
- A set of mixed messages to the public, the regulated community, and NGOs with respect to the Ministry's true position on issues such as partnership, innovation, moving beyond compliance, and other directions for the future.

3.6 A Firm Command and Control Tradition

The current Ministry business plan illustrates this assessment. In the absence of a larger government-wide strategic vision of environmental management, a strong focus on command and control remains as the primary way of doing business. Throughout the document there is a decided emphasis on traditional environmental protection, i.e. setting new regulations and standards for emissions, enforcing the rules including new enforcement measures, and an enhanced capacity to respond to incidents. Many, if not most, of the new initiatives mentioned in the plan are related to this approach.

This is not to say that references to the broader ***strategic shifts*** are completely absent. A number of key principles are invoked, for example: ***partnerships, consideration of the whole ecosystem***, and the need for ***innovation***. However, relative to a number of other jurisdictions, these are not presented within an integrated framework and generally are not as well developed in terms of making fundamental cultural change or creating new ways of doing business.

Other important shifts are not specifically mentioned or addressed, including:

- Establishing continuous improvement with respect to all sources of pollution – large point, smaller point, and non-point – as a high level goal.
- Integrating traditional enforcement tools into a well-developed environmental compliance assurance approach, including a balanced tool kit with economic incentives, binding/enforceable self-management agreements, *bubble* permits supported by policy and regulation, verifiable self-monitoring or accredited third party monitoring programs, etc.
- Developing place-based approaches to environmental management that incorporate the notion of multimedia, total cumulative impact, and ecosystem health.
- A more strategic approach to leveraging the public and NGOs as effective partners in moving beyond compliance with minimum standards through transparent monitoring and reporting.

With this in mind, we can point to a number of program initiatives, most already in place or underway, and one that was not implemented, that provide building blocks for future development. For example:

- MOE operates a disparate array of programs to monitor, assess and report on the quality of the natural environment and emissions. Environmental data and information is gathered in a number of ways including MOE field sampling, industry data, mobile air quality assessment vehicles, and partnerships with other agencies such as the Conservation Authorities. The Ministry is currently looking at changes that would make these various sources more useful for day-to-day inspection, abatement, investigation and enforcement activities. However, considerable work would be required to expand and integrate these databases to support effective cross-media environmental management that was place-based and reflective of a continuous improvement and total cumulative load.

- Ontario has experience in developing what appear to be *one-off* voluntary initiatives to support pollution prevention, including:
    - Memoranda of Understanding focused on the larger stationary point source polluters and are truly *voluntary*, i.e. do not have regulatory backstops and are non-enforceable.
    - Award/recognition programs.
    - Education and training for the regulated community.
    - Establishing education partnerships directed at local small businesses, other groups, and individuals as alternatives to regulation.

  These initiatives, primarily focused on point source polluters and pollution prevention, would need to become part of an integrated approach to environmental compliance assurance.

- MOE did not implement the REVA program (Recognizing and Encouraging Voluntary Actions), which would have encouraged participating companies to prepare three-year environmental improvement plans, institute environmental management systems, monitoring and reporting including a baseline inventory and third party auditing, and public involvement. In return, MOE would have recognized performance, set priorities for the sector, developed *bubble* permits, streamlined approvals, and reduced approval fees. At the time of its development, including the preparation for a pilot with the chemical producing sector, this program would have been an example of a leading best practice. Unfortunately, it appears that the program was caught up in an ongoing internal Ministry debate about whether Ontario could or should be more than just a command and control jurisdiction. The program was never implemented.

- With respect to place-based environmental management, Ontario has some local structures and processes in place based on 100 already-identified watersheds through local conservation authorities. At this point, this approach is used primarily for land use planning, is focused on water, as opposed to multimedia and point/non-point source pollution, and has a mixture of limited monitoring and reporting capabilities. At present they are not integrated with program delivery in resource-based ministries such as MOE, Natural Resources and Agriculture and Food; however, the foundation is there to support a move to a more comprehensive place-based approach to environmental management.

- In January 2000, the Government announced new regulations requiring comprehensive reporting from industrial and commercial emitters. These regulations, when implemented, will be applied to the Ontario power-generating sector. This direction, as a starting point, supports the ***strategic shifts*** of sharing responsibility with NGOs, the regulated community, and the public and, in particular, of leveraging continuous improvement through an informed and involved public. Over time, this approach could be developed into a more comprehensive system to ensure public access to information about environmental performance, including permit information, compliance status, and history of infractions.

- Recent legislative changes to allow for the use of administrative penalties, as opposed to long and laborious court proceedings, in combination with new enforcement tools such as the SMOG patrol and SWAT team, will strengthen the current abatement and enforcement functions. Greater independence, capacity to set priorities, and access to information will be required for this to become an aggressive, efficient, and effective backbone for a new system.

- The *Environet* information technology initiative will provide Ministry Operations with more effective day-to-day information and tools with which to manage current programs. It can also serve as a first step towards a broader and more comprehensive knowledge management strategy in the Ministry and across the Government – one that would support effective environmental management, including transparent, electronic public access to information.

3.7 Management Lessons from Other Jurisdictions

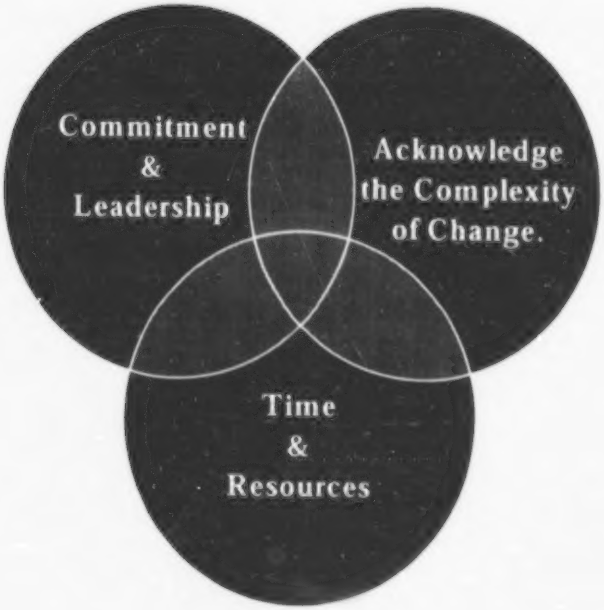
In bringing this section to a close, we wish to draw attention to three factors that, based on our research and discussions, we believe have been particularly important to the ability of other jurisdictions to move ahead.

The first factor is ***strong political commitment and leadership***. Our research suggests that in leading jurisdictions this has been the critical starting point:

- Making the decision to undertake the *journey*.
- Providing the on going political energy and direction to sustain the effort and to ensure that the goals are achieved.
- Working with senior officials across ministries to develop a common vision and to design an implementation strategy.
- Ensuring continuity in terms of people in leadership positions.

The second factor is recognition that effecting cultural change and adopting alternatives to long-standing and apparently successful business practices in any organization is usually very difficult. Our discussions with other jurisdictions indicate that this *resistance to change* appears to be particularly pronounced in the environmental area.

It is important to note that the predominance of the command and control mentality is something that even the most visionary jurisdictions continue to struggle with. They have achieved varying degrees of success with respect to fundamentally changing how they do business, as opposed to simply adding *yet another* layer of programming to a traditional program core. We were cautioned numerous times not to underestimate the complexity of changing the traditional orientation and the time and resources required.



The third factor is the ***availability of resources*** to support strategic direction setting and the process of making change. One of the clear lessons from leading jurisdictions was that, having decided to make the change, they were prepared to dedicate the significant human and financial resources required to think it through, to plan carefully and thoughtfully, and ultimately to begin implementation. Notably, these resources are not primarily field-focused, i.e. more inspectors, more investigators, and more enforcement officials. Rather, they include:

- Resources to establish government as a centre of strategic knowledge and as the leader in developing broader government and public understanding:
    - To develop and absorb lessons from the scientific and research community and other jurisdictions.
    - To develop broad policy directions as opposed to specific program policy initiatives.

- Resources to broaden and deepen participation and engagement of the public, regulated community, and NGOs:
    - To build consensus for new directions and determine local and provincial/state priorities.
    - To engage the public in moving beyond compliance through greater transparency of monitoring and reporting.

- Resources to re-establish and/or build anew linkages to and partnerships with the scientific, research, and technical communities:
    - To build networks to create knowledge, provide advice, and validate or challenge ideas.

- Resources to create management tools and frameworks that are essential to supporting a broader environmental management approach such as:
    - Implementation of an integrated approach to environmental compliance assurance.
    - An information technology-enabled Knowledge Management strategy.
    - A renewed monitoring network.
    - Broader use of risk assessment, risk management, and risk communications methodologies for more than just scientific standard settings, i.e. also for priority setting and resource allocation.
    - The use of more formal procedures and tools to support the identification of Emerging Issues and allow for the development of appropriate new policies and programs.

- Resources required to effectively plan and successfully implement organizational and cultural change:
    - Providing continuity of leadership for the Ministry.
    - Ensuring that the time is available for senior executives to provide strong, thoughtful, and sustained leadership.

- Designing and developing new structures, tools, and processes.
- Establishing internal mechanisms to build consensus and strong support for new directions.

4. Environmental Compliance Assurance

1. Introduction

Compliance assurance consists of public and private "instruments" that can be used to compel firms (and individuals) to conform with formal environmental regulations or with informal rules of conduct and social norms to protect the environment.

As with many jurisdictions, Ontario has recently undertaken a number of initiatives to improve rates of environmental compliance and to begin to encourage *going beyond compliance* actions such as at-source pollution prevention.

Ontario's efforts are consistent with an international trend in environmental compliance that is emerging partly as an outcome of the changing role of government in industrialized societies, and partly because of a growing recognition that enforcement-based compliance alone cannot adequately deal with emerging environmental problems, new business practices and the rapid pace of technological change. Hence, many leading jurisdictions are moving towards an *integrated* approach to environmental compliance: a complementary mix of education, validation (e.g. joint monitoring or research), recognition (positive and negative), negotiation and compulsion.

The research that we undertook (*Environmental Compliance Assurance: A Review of International Best Practices*) included a comprehensive on-line and print review of the available literature on environmental compliance. The literature review was supplemented by discussions with individuals inside government jurisdictions, the private sector and non-governmental organizations. The goal was to clarify the concept of integrated compliance and, indeed, to determine if it can effectively sustain a commitment to *continuous improvement* (going beyond compliance) in environmental performance. Such a commitment could also have a profound impact on the organizational culture – the work norms and practices – of Ontario's Ministry of the Environment.

Another aspect of the research was to look at how effectively various jurisdictions in Europe, the US and Canada are able to deal with the challenge of implementing integrated compliance strategies. As stated by one writer, "The issue for government is not compliance assistance, compliance monitoring, incentives or enforcement, but rather *how to* employ all the tools in the compliance and enforcement tool kit selectively, effectively and holistically."

In addition, we commissioned research into the use of economic instruments for influencing environmental performance (*Research Paper #2: Economic Instruments for Environmental Policy-Making in Ontario, International Institute for Sustainable Development*). Economic instruments include tradable emission permits, environmental labels, and levies. The research was focused on leading examples of economic instruments from other jurisdictions in Canada, US and Europe. We have used the results of this research to determine if economic instruments can effectively complement the traditional methods of compliance assurance.

This section summarizes the main conclusions, findings and applications to Ontario based on the research conducted into environmental compliance assurance.

2. Overall Conclusions

Worldwide, there is a pronounced trend towards an integrated approach to environmental compliance.

- The commitment to change and innovation is strong and the adoption of integrated compliance is rapidly accelerating in leading US, European and Canadian jurisdictions.

- An integrated compliance strategy focuses on environmental performance and policy outcomes and uses the most cost-effective combination of instruments derived from a compliance "tool kit" to achieve the desired policy outcome. This tool kit includes a variety of enforcement, abatement, cooperative agreement, compliance assistance and economic instruments. While emphasizing flexibility and effectiveness, the basic premise of integrated compliance is that the policy *end* drives the selection and design of a compliance instrument or set of instruments.

- While it has a bias towards a partnership perspective of government, business and communities working together to resolve pollution problems, integrated compliance also relies on effective regulatory enforcement.

- Economic instruments also have an important place in the compliance tool kit. Many jurisdictions in the US and Europe have gone beyond the pilot or experimentation stage in using economic instruments to increase environmental compliance.

Integrated environmental compliance assurance fosters a commitment to continuous improvement in environmental performance.

- Integrated environmental compliance assurance is performance-based, recognizes leaders, provides incentives and increases technical assistance to promote the regulated community to go beyond minimum standards.

- An integrated approach will also bring together government, business and communities to resolve *complex, collective action* problems on a sectoral or local basis where regulatory penetration is weak or non-existent. These problems include non-point source pollution from farms, storm sewers, household use of pesticides, etc.

- Economic instruments are a practical approach to encouraging continuous improvement in environmental performance. However, they more often complement traditional command-and-control methods than replace them.

- Accountability for environmental performance by both governments and companies is inextricably linked to a comprehensive environmental monitoring and reporting system with integrated and publicly accessible databases.

To be effective, an integrated environmental compliance assurance strategy must maintain a strong abatement and enforcement presence.

- Overall, the literature strongly supports the view that cooperative compliance initiatives are effective if they are backed up by the threat of credible enforcement action. A credible threat to use enforcement is part of the government's bargaining power to make cooperative initiatives work. "Absent the plausible threat of enforcement, cooperative approaches to achieving compliance seem to have only limited effect on regulated communities" (Crow *et al* 2000).

- Leading jurisdictions are enhancing the enforcement and abatement components of their integrated compliance program through *risk-driven targeting* to set priorities for multi-media investigations and cases (US EPA), remote computer-assisted inspections (Florida, New York, and Pennsylvania), compliance assistance in the early stages of facility approvals, and comprehensive training programs for their environmental officers. This long-term commitment to smarter, more cost-effective enforcement is generally supported by an appropriate commitment of resources.

3. Major Findings

3.1 Introduction

Our research into best practices on environmental compliance was unequivocal in its conclusions about the future direction of environmental compliance policy: "In many leading industrialized countries there is a pronounced trend towards an integrated approach to environmental compliance."

All major jurisdictions are moving in the same direction, although they may be acting from different political and legislative frameworks. In the US, the commitment to integrated compliance has been more top-down than in Canada, reflecting a more centralized federal legislative authority for environmental protection that has often resulted in an adversarial relationship with state agencies. The European Union has a much different and more recent federal structure of national governments. As with agreements on trade, labour and other matters, environmental agreements are between equals and the enforcement ability of the European parliament is rather weak.

The metaphor that is most commonly used to describe the *how* of compliance is a *tool kit* containing a variety of compliance instruments that are employed to achieve certain policy outcomes. What are these instruments? From the literature, there is no commonly accepted typology. This makes it difficult to compare and empirically validate the effectiveness of different compliance instruments. Based on our research into environmental compliance assurance and economic instruments, our version of the compliance tool kit consists of the following *types* of instruments (see inset on next page):

- Enforcement.
- Abatement.
- Cooperative agreements.
- Compliance assistance.
- Economic instruments.

We attach no significance to the order of how the instruments are listed. In contrast, other researchers place the instruments along a policy continuum that ranges from *regulatory* on the one end to *voluntary* on the other, implying a tradeoff of benefits as one moves from one end of the continuum to the other. In practice, however, the distinction between voluntary and

The Compliance Tool Kit

Enforcement – defined as, "any actions taken by governments to gather evidence associated with potential violations, to undertake preparatory work for court actions and all sanctions and follow-up associated with responses to violations of the law" (Canada-Wide Accord on Environmental Harmonization Draft Sub-Agreement on Inspections and Enforcement June, 2000). Examples: mandatory disclosure, investigations and prosecution, civil liability, criminal, administrative and civil sanctions.

Abatement – a broader approach to compliance assurance, where an environmental regulator negotiates (and sometimes imposes) the contents of an abatement strategy for particular facilities with their operators, rather than vigorously prosecuting violations. Failure to follow the abatement strategy could still result in enforcement action. Examples: approvals, permitting, licensing; monitoring, inspections; negotiations / remediation; warnings, occurrence reports; control, stop, remediation orders.

Cooperative Agreement – an agreement that requires parties to meet binding information disclosure and performance outcomes in return for government incentives. Often it includes "backdrop" legislation that may detail the rules and consequences for opting-in or opting-out (also known as creating a "level playing field" or dealing with "free riders") and penalties for breaches. Examples: unilateral industry commitments, public disclosure schemes, recognition programs, negotiated agreements and covenants.

Compliance Assistance – information and incentives to affected parties for them to build the "capacity of regulated entities to comply with environmental laws" (Crow et al 2000). Often, but not always, this is complemented by techniques to reduce or eliminate pollutants and waste at source. Examples: education and training, technical advice, information: plain language legislation and regulations, compliance assistance centres (hot lines, websites, etc), community and business partnerships, codes of practice and guidelines.

Economic Instruments – though often created through legislation and regulation, these are methods of using the market-type incentives and charges that will motivate compliance and exemplary environmental performance. Such instruments are said to "internalize" the environmental costs into a process, service, product or activity. In theory, high-polluting products should cost more to make than low-polluting products. Examples: tradeable emission permits, emissions charges and "feebates", financial assurance, subsidies and deposit-refund systems.

enforced compliance is arbitrary, if at all even relevant. As one US EPA report puts it: "We know that a wide variety of environmental strategies – both regulatory and non-regulatory – are possible. The greatest challenge in the future will be to select among all the options available to design the most effective response to existing and emerging environmental problems."

Acknowledging then, that under integrated compliance it is the policy *ends* that drive the selection and combination of compliance instruments, we have organized major findings from the research on compliance instruments according to four major policy ends:

- Controlling point pollution sources
- Reducing priority pollutant emissions
- Controlling non-point pollution sources
- Encouraging continuous improvement

3.2 Controlling Point (facility) Pollution Sources

Controlling point sources of pollution through facility approvals is part of the enforcement and abatement tool kit traditionally used by environmental agencies around the world.

In most jurisdictions, facilities require a legal instrument, normally a permit or approval certificate, to emit contaminants into the environment. Once a permit is granted, the facility usually must submit regular compliance reports to the approval agency. It also may be subject to periodic inspections. The facility operator may be prosecuted for violation of the permit if it is found to exceed the allowable contaminant releases or fails to implement certain treatment procedures. The operator may also enter into a negotiated agreement with the approval agency to take corrective or abatement measures. (Abatement is often the preferred first step in Ontario. Enforcement through prosecution is usually an instrument of last resort.)

This traditional compliance approach for controlling point source pollution typically applies to manufacturing, utility, waste management and resource extraction operations – usually medium to large in scale. Facility-specific compliance requirements are less commonly applied to the retail, service and agricultural sectors of the economy.

Facility or point source compliance is often the most contentious issue in environmental compliance management. Industries complain about the high cost, extensive paperwork and lengthy delays for obtaining a permit and for complying with its requirements. They also complain about the overlapping, and sometimes conflicting jurisdictional inspections. Communities also often find the process arduous and expensive. Many do not have the resources or legal and technical expertise to meaningfully participate in an approvals process. On the other hand, if they do not accept the outcome of a facility approval, they may challenge a decision in the legal, political, and public arenas.

Governments also find traditional point source compliance to be expensive and conflict-laden. It is inflexible to new scientific information on contaminants and to the adoption of innovative pollution control practices and technologies. It often also does not distinguish between environmentally significant facilities such as a hazardous waste treatment plant, and less significant activities such as a vegetable processing plant.

Nevertheless, our research found no examples of jurisdictions formally contemplating to abolish traditional approaches to facility or point source compliance. Instead, we found that extensive effort has been made since the early 1990s to introduce enhancements such as administrative improvements, streamlining, standardization, ***permit-by-rule***, field orders, inter-jurisdictional harmonization, and ***bubble permits*** for multi-facility operations.

There is also a renewed emphasis on customer-service models through the application of Internet-based databases and technology solutions. US EPA and several state agencies (Florida, New York, and Pennsylvania) are now experimenting with handheld computer assisted technologies for field inspections. In Ontario, similar technology is being used in a pilot program to coordinate inspections of pits and quarries by four ministries (Labour, Natural Resources, Transportation, and Environment). The program is run by the Inspection, Investigation and Enforcement Secretariat, established to provide leadership on improving and coordinating compliance activities across the Ontario Government.

In a sharp departure from previous practice, one US EPA regional office has implemented a "state of the art, risk-driven targeting" system to set priorities for multi-media investigations and cases. The approach uses geographically-based computerized data to target facilities whose possible permit violations might pose significant risks. Rather than rewarding enforcement divisions for filing high numbers of cases and collecting large amounts of fines, the shift is towards working with high-risk facilities to improve environmental performance.

The implementation of technology-enablers and *smarter* enforcement practices has also meant a renewed emphasis on better and more comprehensive training for environmental inspectors and enforcement officers. The international Commission for Environmental Cooperation, for example, has recently published a compendium of 164 environmental enforcement-training programs. The kinds of enforcement tools that inspectors are being trained to use are far more comprehensive and sophisticated than ever. As made evident by a recently published guide by the US General Accounting Office, today's environmental officer must have the know-how to source information about people, property, business and finance through a variety of databases.

Our research also found a number of promising cases of where innovative, performance-based instruments have been used to augment traditional compliance instruments for controlling point sources of pollution. For example, instead of applying for a traditional facility permit, under Massachusetts' *Environmental Results Program (ERP)* an eligible firm must submit an annual self-certification of compliance signed by the most senior corporate official at each facility. If a facility is not in compliance, it must submit a *return to compliance* plan. All facilities are subject to inspection; and all reported information goes into a central database. The program currently applies to three small-business sectors: dry cleaning, photo processing and printing, but will be expanded to include firms installing or modifying boilers, industrial waste dischargers, chip fabricators, wire board fabricators, and auto body shops

Facility approvals requirements in Alberta are also being continuously improved and simplified. All *activities* in the province are classified according to three tiers depending on the level of environmental impact. As an alternative to costly prosecutions, Alberta has also introduced administrative penalties for a list of more than 200 minor infractions of the *Environmental Protection and Enhancement Act.* An administrative penalty is usually a fine, combined with a remedial enforcement order (abatement). In 1999, Alberta's environment ministry launched the *Alternate/Innovative Regulatory Strategies* (AIRS) program to look at alternatives to enforcement-type of approvals for facilities.

The research also found that innovations and improvements to facility compliance, especially in the US and Australia, are often strongly complemented by *compliance assistance* programs. While compliance assistance is not necessarily restricted to just controlling point source pollutants, its most visible impact is on facility approvals especially for small-to-medium enterprises (SMEs), many of which lack the technical expertise to comply with the approval requirements.

Pennsylvania's compliance assistance programs were found to be very interesting in terms of the depth and breadth of the support they provide, including: advisory programs, contact information, environmental management services, free scientific and technical assistance, confidential assistance and preliminary environmental evaluations for SMEs, monitoring manuals, self-audit checklists and workbooks. The programs are delivered by public-private partnerships through a variety of telephone, online and formal training channels.

Massachusetts' self-certification process is facilitated by a compliance assistance program provided through sector-specific workbooks written in plain English (and in other languages such as Korean and Spanish) and workshops, along with practical information on pollution prevention.

The federal government of Australia has made effective use of the Internet to provide a ***one window*** approach for new and existing businesses to obtain the required environmental, labour and health approvals at the federal, state and territorial levels.

US EPA, in partnership with industry associations, environmental organizations, universities and other government agencies has launched one of the most extensive compliance assistance programs in the world. The main feature of the program is ten compliance assistance centres accessible through the Internet and toll-free hotlines. Eight of the ten centres serve sectors with small businesses; the other two serve local governments and federal agencies. US EPA's compliance assistance programs go beyond meeting approval requirements. The agency has also published a number of comprehensive industry sector notebooks. Since 1982, US EPA has had a Small Business Ombudsman to increase access to the agency and to help small business comply with environmental regulations.

Summarizing from this research, we present the following key learnings on integrated compliance as applied to controlling point source (facility) pollution:

(1) Leading jurisdictions continue to have a strong traditional compliance track (abatement and enforcement through permitting and inspection) at the core of an integrated compliance strategy for controlling point source pollution. This track is linked to a parallel alternative approvals track usually including cooperative initiatives such as self-certification.

(2) There are many best practices available (some of which have been already adopted in Ontario) which improve the efficiency and effectiveness of the traditional compliance track. Alberta has introduced two noteworthy innovations: a tiered approvals process based on the degree of environmental impact and flexible administrative penalties for minor infractions.

(3) The use of new technologies, such as computer-assisted inspections and the new generation of geographic information systems, are very promising tools for permitting and inspection. However, as with most technology-enablers, these computer-enhanced tools are cost-effective when introduced in tandem with a significant investment in approvals-process redesign and training programs for environmental officers resulting in smarter, more cost-effective enforcement.

(4) Leading jurisdictions (US, Australia) place a very high priority on providing compliance assistance or outreach to the regulated entities, especially for SMEs and local governments. Environmental compliance assistance can be introduced at *business entry points* (Australia) which include compliance assistance with health, labour, commercial and other regulatory requirements. The delivery of compliance assistance can be done effectively through partnerships with the regulated sectors and training institutions (US). Such programs are designed to be delivered on-line, through specialized call centres (technical hotlines) and formal training sessions. Often they go beyond compliance with approval requirements to include best practices in the industry sector.

(5) A tiered-approach to facility approvals (Alberta) has promising application to SMEs in industry sectors that are often difficult and costly for environmental agencies to administer under the traditional approval track (permitting and inspections).

(6) Self-certification using codes of practice appears to be more appropriate for sectors: (a) dominated by SMEs and those normally outside of the traditional approvals track (e.g. agriculture); (b) that have similar industrial processes; and, (c) with predictable environmental impacts. Some form of self-certification, using environmental management systems, may be appropriate in large and multi-facility operations in *mature* industry sectors.

(7) Third party verification and public disclosure of environmental performance information (New Jersey) along with a meaningful

opportunity for stakeholder involvement, including specialized technical training for stakeholders (Massachusetts), are critical to the credibility and public acceptance of alternative track approvals processes.

3.3 Reducing Priority Pollutant Emissions

An environmental agency is typically responsible for establishing targets, standards, bans and phase-outs for the emission of priority pollutants into the environment from all sources. These environmental requirements may have legal force or they may exist as guidelines. In addition, the methods of treating or mitigating the impact of the contaminants may be legally prescribed and are typically enforced through inspection and monitoring programs.

The process of listing and delisting priority pollutants in regulatory schedules, and the corresponding control requirements, is often very time-consuming, expensive, adversarial and controversial. Compared to most facility approvals, which tend to have a more local impact, the issues around controlling priority pollutants can be international in scale. The economic implications of banning a substance or reducing its concentration in a product, or requiring that *best available* technologies be adopted, can be enormous for entire industrial sectors. Compliance is typically enforcement-based, relying ever more on sophisticated technologies and laboratory procedures for detection. Hence, most leading jurisdictions require extensive consultation and negotiation on regulatory initiatives; and, in many cases, they now also require comprehensive regulatory impact analyses.

Cooperative agreements

Increasingly, many jurisdictions are entering into negotiated or cooperative agreements with industry sectors (rather than with individual companies) to achieve pollution reduction and prevention targets. Ontario, for example, together with the federal government, has entered into several memoranda of understanding (MOUs) with key industry sectors; and, in at least one case, with a single steelmaking firm. Similar agreements have been implemented in the US since 1995 through federal-state cooperation under the *National Environmental Performance Partnership System.*

Some agreements have been entirely industry-led, such as the *Responsible Care* program launched in 1985 by the Canadian Chemical Producers Association. The program, based on six voluntary codes of practice, has now been adopted in 42 countries and given recognition by the United Nations.

Canada's Accelerated Reduction/Elimination of Toxics (ARET) program, on the other hand, is a joint initiative of government and industry in operation since 1994. To accept the *ARET Challenge* a participating company must commit to developing and implementing an action plan to reduce or eliminate emissions of the ARET list of substances.

Some critics doubt that most cooperative agreements in Canada meet the requirements of legally binding contracts. The danger, they say, is that such agreements may become weak proxies for enforceable environmental regulations if they lack credible sanctions for non-compliance and offer no means for external verification. On the other hand, when combined with a credible regulatory threat, performance-based cooperative agreements are also recognized to have the potential of promoting innovative, multi-media pollution prevention strategies.

There have been some constructive attempts by various stakeholder groups to come to terms on the role of cooperative agreements in an integrated compliance strategy. In 1997, an *ad hoc* group of environmentalists and industry representatives, called the New Directions Group (NDG), adopted a useful set of criteria and principles for the design and utilization of *voluntary non-regulatory initiatives* (VNRIs). The criteria address the need for cooperative agreements (our preferred term) to be participatory, transparent, performance-based, and backed by a strong policy or regulatory framework.

One of the most advanced examples of a cooperative agreement is Oregon's *Green Permits* system. Though still in its infancy, *Green Permits* applies a *tiered approach* to facility approvals, focusing on performance requirements that are facility or site-specific, multi-media and non-prescriptive. There are two kinds of green permits. A *custom waiver permit* allows some flexibility in compliance with regulatory requirements – often prescriptive ones related to specific technologies or industrial processes – to help a facility perform better than required. A *green environmental management systems* (GEMS) permit requires a facility to have an environmental management system (such as ISO 14001), demonstrate superior environmental performance, publish annual performance reports and commit to ongoing communications with stakeholders. There are three tiers of GEMS permits: participant, achiever, and leader.

On the basis of the research, cooperative agreements have a significant role in an integrated compliance strategy for reducing priority pollutants. The following are some of the key learnings:

(1) Cooperative agreements are more applicable to *mature* industry sectors, which are well organized and have already demonstrated a commitment to environmental excellence. Such sectors tend to be dominated by mid-to-large enterprises.

(2) Cooperative agreements are most effective if they have a strong regulatory backdrop that discourages *free riders* on the one hand, while on the other, encourages participation by all members of an industry sector and provides sanctions for non-compliance. As well, the agreements should include clearly stated goals, targets and timelines, and regular performance reports.

(3) Cooperative agreements must provide some tangible benefits to industry in terms of public recognition, regulatory flexibility and relief, where there is strong and independently verifiable evidence of environmental excellence. At the same time, industry needs to be assured that it is protected from regulatory jeopardy as a result of good faith information disclosure.

(4) Joint compliance assistance programs can become useful entry points for cooperative agreements in specific industry sectors with a large

number of SMEs, such as in the automotive repair industry. (An example is the Hamilton District Autobody Repair Association's 1995 partnership with MOE to disseminate information on environmentally-sound business procedures.)

(5) Stakeholders and the public must be involved up front in the negotiations and writing of the agreements, and in monitoring their implementation.

(6) Cooperative agreements must include substantive provisions for data verification, preferably by independent parties.

Economic instruments

In addition to cooperative agreements, leading jurisdictions in Europe and the US are harnessing market forces to drive and motivate compliance with environmental policies aimed, in particular, at reducing priority pollutants. Examples of market-based economic instruments include programs for tradable emission permits, emission charges and *feebates*, financial assurance, subsidies and deposit-refund systems. Such programs can be administered by a government agency or through cooperative agreements by either industry-led or multistakeholder councils involving consumers and environmental organizations.

The commissioned research identified a number of potential benefits of economic instruments. One benefit is that they can be used to implement the *polluter pays* principle while giving government added flexibility to redeploy scarce enforcement resources to critical environmental problems. A second benefit is that they can help pay for environment infrastructure, making it more financially sustainable in the long term. Economic instruments can motivate the greening of industry processes and business strategies and stimulate the development of green technologies. The difficulty is that the design of market-based economic programs for compliance is very complex. Implementation of such programs is often within the context of broader fiscal policy and regulatory reforms.

With only a few exceptions, Ontario has not been a leader in the implementation of economic instruments. Trading programs for greenhouse gas emissions are still in the pilot stage (Ontario). Environmental charges (sometimes called *user-pay*) for disposal and effluent release into municipal systems are widely in use, but very few are designed to influence behavior. Financial assurance exists for high-risk activities (e.g. landfills, mine reclamation, hazardous materials transport). Deposit-refund systems are numerous and well-established for beverage containers (Alberta, Nova Scotia). Other related product-stewardship programs such as Ontario's Waste Diversion Organization, also use a form of economic incentive to drive environmental performance.

In contrast both the US and European Union countries have implemented major nation-wide economic instruments. The US has made widespread use of emissions trading to address smog, acid rain and lead in gasoline. Market-based approaches are being built into virtually all US EPA rules for motor vehicles and engines. Numerous watershed protection programs have also featured economic instruments to address both point and non-point sources (California).

European countries have emphasized environmental taxes and charges. Revenue-neutral tax restructuring is a cornerstone of air quality and quality change initiatives in Sweden, Norway, Denmark and the United Kingdom. France has used effluent charges with revenues recycled back as its key water quality protection policy. Germany has implemented a nation-wide advance disposal fee and high curbside disposal fees to achieve very high rates of solid waste diversion.

Our commissioned research has identified the following key learnings on best practices for economic instruments:

(1) From large nation-wide to local applications, there is extensive practical experience with most economic instruments.

(2) The design of economic instruments must take into account complex issues around market structure, firm and household behavior, and financing issues. Different analytical skills and information than traditionally used in environmental policy designs are often required.

(3) The development and implementation of economic instruments requires a long-term investment into the meaningful involvement and education of stakeholders and the public.

(4) Economic instruments rely on traditional regulatory and legislative frameworks to provide the necessary triggers for use, to prevent *free riders* and to provide a level playing field in a competitive marketplace.

(5) Many leading jurisdictions are using industry-led and multistakeholder councils to administer the collection and management of environmental charges. Other non-government entities have been established to administer emission trades.

(6) Some small environmental charges work very well, serving to both cover the cost of environmental programs and also to encourage behavioral change. However, for large-scale environmental charges to work, they likely have to be implemented within broader tax reform initiatives that motivate positive environmental performance.

3.4 Controlling Non-point Pollution Sources

Non-point source pollution has been estimated to be the largest source of water quality problems in the US. Major diffuse or non-point sources of pollutants into water bodies include runoff from agricultural operations and urban areas, seeping septic systems, drainage, and atmospheric deposition. These sources release sediments and nutrients, oils, grease, toxic chemicals, road salts, pesticides, and pathogens. Some of these contaminants go directly into the environment, others pass through municipal storage sewer systems. As well, motor vehicles are the largest non-point source of smog-causing pollutants in the atmosphere.

Although trans-boundary migration of pollutants is not normally considered non-point source, for practical pollution control purposes it is virtually the same thing: it is outside the jurisdictional scope of traditional compliance practices. For instance, while Ontario's *Environmental Protection Act* empowers the Minister to shut down industries on very high smog days, the Minister is powerless to do anything about the drift of smog-causing pollutants from the US that are responsible for about half of the province's smog.

The importance and impact of non-point source pollution has been well understood for many years; especially in the Great Lakes Basin. However, non-point source pollution is typically more difficult to identify and control than traditional point sources. Consequently, controlling point sources has been the emerging trend in recent environmental regulations and policies. Only since the early-to-mid 1990s has the focus begun to shift in a significant way toward the cumulative impacts of urban sprawl, stormwater diversion, irrigation practices, impervious surfaces, household consumption and gardening, small-to-medium enterprises, combustion engines (cars, trucks, snowmobiles, boats) – literally millions of pollution sources.

One of the features of an integrated environmental compliance assurance strategy is that not only does it consider the cross-linkages and multi-media aspects of various performance-based compliance instruments – enforcement, abatement, cooperative agreements, compliance assistance, economic instruments – but also the most common sense way of targeting all sources of pollution – ranging from large stationary point sources to millions of mobile non-point sources. From our research here are some ways that these instruments are being applied to non-point sources:

- Innovative tiered approvals processes (Massachusetts, New Jersey, and Oregon) that are effectively targeting SMEs in difficult-to-enforce sectors like printing, metal finishing, and automotive repair.

- Joint compliance assistance programs (US EPA, Pennsylvania, Massachusetts, Australia) that target agriculture, printing, small manufacturers, and automotive repair. Such programs have widespread potential for other non-traditional enforcement sectors like offices and shopping facilities.

- Government-industry partnerships in vehicle inspection and maintenance programs like Ontario's Drive Clean; product stewardship programs that aim to divert hazardous materials and valuable resources from the waste stream.

- Public participation programs in the monitoring of water and air quality; public education programs on household best environmental practices and vehicle use.

- Economic instruments: environmental charges such as tradable permits (tiered pricing of irrigation water) in California; user-pay systems for garbage (Victoria, BC); industrial property tax exemptions based on environmental performance (Louisiana); and tax-subsidies for energy conservation.

Watershed Management Approach

Using a watershed as a distinct biophysical unit for environmental management is a significant step forward towards integrating numerous compliance instruments and the monitoring of contaminants from point and non-point sources. Since the early 1990s, US EPA and many state environmental agencies has been moving from *end-of-pipe* controls to tailored strategies to improve overall watershed health, not just water quality. All 50 states, six territories and 80 tribes have completed comprehensive watershed assessments. US EPA's approach has subsequently changed how facility permits are issued to industry and to municipalities and has introduced new requirements for monitoring, reporting and shared database management.

Our commissioned research into best practices in mainly US jurisdictions (Ohio, Washington, New Jersey, Pennsylvania) suggests that it makes sense to structure environmental management, compliance and infrastructure development on the basis of watersheds. Water and air quality monitoring programs are being designed with public and private stakeholder consultation and managed on a watershed basis. This allows the information to be used for land use planning, community development, industrial and municipal discharge permitting and other watershed related purposes.

3.5 Encouraging continuous improvement

From the research it is clear that alternative performance-based approaches to compliance are credible and publicly acceptable only insofar as they can demonstrate that they can exceed the regulatory *status quo*, that is, they have built-in incentives for going beyond compliance and for implementing environmental best practices and innovations that ***would otherwise not have happened.***

Most leading jurisdictions, which have implemented best practices in performance-based compliance, have included a strong commitment to fostering continuous improvement in environmental performance. In an integrated compliance approach, environmental excellence is typically encouraged through a combination of incentive and traditional regulatory sanction. As well, most leading jurisdictions, including Ontario, have implemented voluntary recognition programs for industry leaders in pollution prevention and waste reduction.

Nevertheless, from the research we have identified three outstanding best practices of incentive-based programs that can drive improvement in both environmental performance *and* accountability:

- *Project XL*, which stands for *Excellence and Leadership* is a US EPA national initiative that tests multi-media innovations in health and environmental protection that go beyond compliance with existing requirements. The lessons learned from Project XL are used to assist US EPA with redesigning its regulations and policies. So far, it has identified at least 25 major innovations and ten more that are emerging that can be applied to the agency's core functions. Project XL is open to business, local and state governments and communities with a good compliance history with EPA regulations. One of the challenges was to find ways that would allow companies to experiment, but still hold them accountable for performance and results.

- US EPA has recently launched a new *National Environmental Performance Track* program to encourage, recognize and reward environmental performance at two levels: environmental achievement and environmental stewardship. Successful participants receive national recognition, access to state-of-the-art information, and regulatory and administrative flexibility.

- Florida is a recognized leader in using quarterly environmental reports to evaluate the state's environmental agency's performance in achieving its mission of "more protection, less process." The environmental indicators are collected and presented in four tiers. This tiering approach of performance data helps to identify underlying causes of problems and potential policy interventions.

The Florida example demonstrates the clear need for a comprehensive monitoring and reporting program to supply reliable and timely performance feedback to the public and to environmental managers. Increased accountability helps to drive continuous improvement in compliance activities of government; which, in turn, has the potential to drive continuous improvement in the environmental performance of companies and communities.

4. The Ontario Context

The Ministry of the Environment initiated a major consultation program (*Responsive Environmental Protection*) in 1996 to reform its environmental regulations and approvals processes. In 1997, the Minister announced 38 major regulatory reforms. This was followed by legislation to streamline the approvals process. However, MOE continues to be focused mainly on traditional command and control approaches to compliance assurance. In our view, significant development work would be required to implement a new and integrated approach.

In looking at leading jurisdiction and drawing comparisons with MOE, we observe that the Ministry has made little or no progress towards where leading jurisdictions are currently in terms of new and innovative approaches to integrated environmental compliance assurance. Attempts to bring forward initiatives that reflect this approach have been marginalized within the Ministry on the grounds that they would jeopardize ongoing and future abatement and enforcement efforts.

Although there have been numerous attempts to initiate cooperative agreements (in fact, MOE was viewed as an initial leader in the early-to-mid 1980s using a cooperative agreement with beverage and container material producers to implement the Blue Box recycling program) there has been little progress in recent years. There have been a few exceptions such as the Waste Diversion Organization, recently formed to collect and manage contributions from a number of industry sectors to the Blue Box program.

In the area of compliance assistance, MOE often develops effective communication strategies for new program and regulatory initiatives. These strategies are delivered by program staff with involvement of the Ministry's Operations Division, but are not sustained much after the initial outreach to the principle stakeholders has been accomplished. MOE is also involved in a pollution prevention focused initiative with large, medium, and small enterprises. There is no MOE broad, ongoing program to provide compliance assistance; and no links exist between environmental compliance assistance and Ontario's *Business Connects* program as the *one window* for business access to government.

Ontario has not been a leader in using economic instruments. The Province has, however, initiated several pilot trading projects (Pilot Emissions Reduction Trading program and Greenhouse Gas Emissions Trading program), implemented funding for the Blue Box as an environmental charge, required financial assurance for landfill sites and the transportation of hazardous wastes and a deposit return system for beer. These initiatives, however, have not been part of a broader more integrated approach to compliance assurance.

MOE has been working with the Ministry of Labour and other ministries with a regulatory mandate to review opportunities for delivering inspections, investigations and enforcement activities. A cross-ministry secretariat has been established to coordinate planning, training and other common functions. In the longer term, there is a possibility of integrated enforcement

During our interview with MOE staff, it became apparent that there are resource and priority-setting issues around the preparation and bringing forward of Crown Briefs for prosecution.

5.0 Governance for Environmental Management

1. Introduction

Governance models for environmental departments were one of the key areas incorporated into our review. We were particularly interested in whether there was a correlation between specific models of governance and degrees of success in leading environmental jurisdictions that were undertaking the strategic shifts referenced throughout our report.

In addition to our discussions with officials from other jurisdictions and our own research and review of the literature, we commissioned research on the issue of governance models in other environmental jurisdictions. *(Research Paper #3: Review of Governance Models in Environmental Management, Stratos Inc.)*

Reflecting our synthesis of the research and our discussions, the purpose of this section is to provide the following:

- Overall conclusions with respect to the significance of governance models in environmental management.
- Specific examples of practices in leading jurisdictions drawn from the research commissioned for this project, as well as other sources.
- An overall assessment of the current Ontario context with respect to governance models.

2. Overall Conclusions

Our research and analysis supports the following conclusions with respect to governance models for environment ministries/departments:

- Little formal research exists with respect to the effectiveness of various governance models for environmental management.

- Our research did not indicate a strong correlation between any particular governance model, e.g. degree of delegation to lower levels of government, local authorities, etc., and effective environmental management or benchmarks for success.

- There is some evidence that other factors – most notably political leadership and commitment, the breadth of a government's vision, and the extensiveness of processes for involving the public, NGOs, and the regulated community in policy development and consensus building – may be more important in terms of overall impact and effectiveness.

- Our research supports the view that the environment is a policy and program field that cuts across traditional mandates of government line departments as well as other jurisdictions. A number of jurisdictions have established overall strategic visions for the environment, including cross-government goals and performance targets, within which line ministries undertake their responsibilities. Often, these approaches include a high level, clear centre of responsibility for overall coordination and monitoring of results.

- To a certain extent, the balance struck between centralization and delegation is rooted as much or more in constitutional or political considerations, as it is in environmental considerations. Where a government tradition or culture of delegation to local authorities or different levels of government exists, it is more likely that some degree of delegation exists in the environment area as well.

- Within non-Canadian jurisdictions based on Parliamentary democracy, i.e. those with ministries, many jurisdictions place strategic direction setting, policy formulation, standard setting, and other high-level functions in some form of a ***ministry of the environment***, headed by a member of the Cabinet. While strategic planning policy is retained as a core ministry function, there are many examples of governments establishing agencies, councils, other levels of government, and partnerships with outside organizations for policy formulation advice to government. In most of these cases, responsibility for actual delivery, including operational policy, enforcement, assessment, permitting/licensing, monitoring, research, etc. rests with arms-length agencies of government and, in some cases, regional or municipal government. These agencies have politically appointed Boards of Directors or Administrators and are administratively and operationally self-sufficient.

- Based on our research, preconditions exist for the ultimate success of these distributed responsibilities. As demonstrated below these preconditions relate to clear and effective management practices, rather than a specific structural approach:

  1. A clear mandate enshrined in a legislative framework.
  2. Sufficient resources to undertake that mandate.
  3. Clear performance expectations and accountability mechanisms including transparent public reporting.
  4. Periodic evaluation and reconfirmation of mandate.
  5. Clear mechanisms for coordinating the activities of the organization with relevant partners including government.
  6. Clear expectations with respect to public consultation and engagement.

3. Major Findings

3.1 Operating Agencies

Many of the jurisdictions surveyed as part of our review created some form of *environmental protection agency* for the purposes of delivering environmental programming. The term *agency*, however, was used in two distinctly different ways, depending on the system of government. It is important at the outset for us to explain that distinction. The primary difference we identified is between jurisdictions that have a Parliamentary form of government, i.e. have Ministries/Ministers, and Republican or US-style government.

Parliamentary Jurisdictions

In most of the non-Canadian Parliamentary jurisdictions we surveyed, environmental management responsibilities are divided between ministries of the environment and operating agencies. Ministries are under the political governance of a Minister/member of the Cabinet. They typically have responsibility for establishing legislative frameworks, setting strategic direction and goal setting, policy development, standards setting, and overall performance monitoring.

The operating agencies are usually stand-alone, i.e. administratively self-sufficient, arms-length bodies governed by politically appointed Boards of Directors under a Chair or politically appointed Administrators/Director-Generals that reports to the Minister of the environment. The specific responsibilities of these agencies vary from jurisdiction to jurisdiction. Generally, however, they include: licensing/permitting, enforcement, operational policy, establishing local targets, environmental monitoring, research, and communications/public education and outreach. This general breakout of responsibilities is in place in the United Kingdom, Sweden, Norway, Denmark, and most of the Australian states.

Our discussions with participants in this review, as well as our own public sector experience, suggests that the division of responsibilities between ministries and operating agencies has a number of benefits including:

- Greater opportunity at the ministry level to focus on cross-government strategic direction and coordination, broad policy formulation, and monitoring against overall government goals and targets.
- Less likelihood that the minister and ministry will have their time largely absorbed by day-to-day operational issues and crises.
- Greater capacity at the operational level to focus on program delivery issues and customer/stakeholder requirements.
- Greater independence at the operational level in terms of regulatory/enforcement decision-making.
- Greater flexibility and opportunity, through operating agencies, to engage the regulated community, NGOs, the scientific and academic communities, and the public in more open and transparent information sharing, dialogue, consultation, and partnerships, within the overall legislative framework and accountability mechanisms.

The United States

In US jurisdictions, directly operated government departments that in Canada we would refer to as ministries, are often called *agencies*. The US EPA and most state-level environmental protection agencies/departments are headed by a politically appointed head, referred to typically as *Administrator*, *Secretary*, or *Commissioner* (as opposed to elected ministers). Most often, these agencies/departments incorporate all of the functions of government outside those reserved for legislators, including strategy planning, policy development, program design, research, assessment, permitting, abatement, enforcement, outreach and communications, i.e. comparable to a Canadian ministry of the environment.

Almost all states have little or no delegation of major operational responsibilities to arms-length agencies. Some states do delegate relatively specific and minor functions to arms-length bodies such as reviewing state licensing/permitting decisions (Maine) or selecting sites for low-level radioactive waste (New Jersey).

Other Exceptions

As is often the case, there are exceptions to these rules on all sides:

- The Wisconsin Department of Natural Resources is governed by a seven-member Board of Directors, directly accountable to the Governor, as opposed to an appointed Administrator.
- Oregon's Department of Environmental Quality is governed by a five-member Environmental Quality Commission. The Commission also sets policies and rules, issues orders, hears appeals of fines or other department actions, and appoints the Department's director.
- California has a complex system of Boards for major policy and operational functions that in other states are usually under a single department. For example, the 11 member Air Resources Board, appointed by the Governor, sets standards and implements and enforces those standards, conducts research, and performs relevant environmental monitoring. It operates at a local level through five local boards of air quality management. A similar structure is in place for the Water Resources Control Board.
- In New Jersey, the Department of Environmental Protection delegates monitoring, inspection and enforcement responsibilities to County Environmental Health Authorities. This relationship, in place for 19 of 21 counties in the State, is formalized in a contract that sets out the specific responsibilities the Authorities assume (these may differ by county). Although the State supports this delegation by a financial transfer and training, the counties contribute their own resources as well. The Department retains direct authority over complex files (e.g., large industrial facilities, high-profile matters).

- The Netherlands Ministry of Housing, Spatial Planning, and the Environment sets national environment directions and policies. Much of the operational responsibility is delegated to other levels of government, as opposed to operating agencies, including regional and local authorities and municipalities. This delegation includes operational policy development and local planning within the overall framework, local monitoring, and enforcement. The Dutch Inspectorate for the Environment supervises how these local authorities implement environmental policy.

- The Danish Environmental Protection Agency delegates some of its operational responsibilities – particularly local permitting – to municipalities. Municipal decisions can be appealed to the Agency. However, it was reported that small municipalities often lack the resources (i.e. funding, staff, training and development) and the political will to discharge this responsibility and there are concerns whether Denmark's local delegation will be effective.

- New Zealand maintains overall strategic direction setting and policy development at the ministry level. However, under its *Resource Management Act* ("RMA"), operational responsibilities are delegated to local authorities across the country. Many of these local authorities have found it difficult to discharge their increased environmental mandate to determine environmental values and assess environmental impacts because of inadequate staff, training, and other resources. These constraints are reported to have slowed down the implementation of the RMA. In 1997, the Organisation for Economic Co-Operation and Development noted in its *Environmental Performance Review* of New Zealand that "additional support from the central government in the form of policy guidance, database development and environmental research could lighten the burden on local authorities and strengthen RMA implementation".

3.2 Specific Functions of Government

For the purposes of our review, we identified the following functions/responsibilities of Government for closer examination:

1. Scientific research.
2. Monitoring, including Point Source and Ambient quality monitoring and State of the Environment reporting.
3. Policy setting.
4. Standard-setting.
5. Technical assistance.
6. Environmental assessment.
7. Inspections.
8. Investigation and enforcement.

1. Scientific Research

Basic scientific research is a primary but not an exclusive government-funded responsibility across all jurisdictions surveyed. Although research can be a shared responsibility across levels of government, it more recently tends to be undertaken at the national level, in response to budget considerations at lower levels of government. In the United States, for example, the federal government spends twenty times more than the states on research and development. However, leading states such as New York, California, and New Jersey allocate research funds with the goal of levering federal and other funding. While the ratio is lower in Canada, the Canadian federal government funds the overwhelming share of environmental research conducted in the country. Research is done both in-house and in government-funded institutions such as universities.

The various models (discussed more fully in Section 9.0 Access to Scientific and Technical Expertise of our report) range from:

- Large, highly resourced and highly centralized, government research programs (US EPA).
- Smaller government research bodies that coordinate the distribution of research funding against established priorities to external research organizations (Sweden, Health Canada, UK).
- Smaller in-house, research programs that are looking increasingly at external partnership as a way of dealing with limited resources. (Great Lakes Commission).
- Private sector research organizations built around particular industry sectors/industry associations, e.g. pulp and paper.

2. Monitoring and Reporting

Ambient quality monitoring and reporting

Most governments are retaining responsibility for ambient monitoring. However, leading jurisdictions are developing partnerships to support this responsibility. Increasingly, because environmental issues cross-jurisdictional boundaries, monitoring programs are being integrated and managed cooperatively between jurisdictions.

In Sweden, the government appoints the environmental monitoring board at the Swedish EPA. It has ten members and a chairperson. The board annually distributes financial resources to prioritized environmental monitoring measures in accordance with established national and regional environmental monitoring programs.

Many jurisdictions produce at least partial reports on the state of the environment (SOE). However, the extent to which environmental indicators and performance measures have been established varies across agencies. Sweden's SOE reports are enhanced by the existence of National Environmental Quality Objectives, which provide guideposts to measure progress. New Zealand, however, appears to be having difficulty identifying and reporting on environmental performance, perhaps due to the highly decentralized nature of environmental management in that country.

Sweden and the Netherlands seem to rely more on SOE reports to publicly evaluate policy performance and program development than other jurisdictions. In the Netherlands, a separate scientific body, the National Institute of Health and the Environment, is responsible for ambient and point source monitoring and SOE reporting. The Environment Programme in the Netherlands continuously reports the progress made and gives an overview of plans for the coming four years. These plans are based on the *Third National Environmental Policy Plan* (NEPP3) and the *Policy Document on the Environment and the Economy.*

Point Source Emissions Monitoring

Point source monitoring responsibilities are shifting to industry and municipalities in leading jurisdictions. Accuracy and reliability are being ensured by third party audits and by making company officers legally accountable. Leading jurisdictions facilitate public access to environmental monitoring data. As data is produced, it is being made available to the public through the Internet.

The general trend across most leading governments is to rely increasingly on self-monitoring and reporting, within government accountability frameworks, particularly for larger point source industry and municipal polluters. Increasingly, accuracy and reliability are being ensured by third party audits and by making company officers legally accountable. As data is produced, it is being made available to the public through the Internet.

To provide an incentive for accurate reporting, California treats self-reported violations more leniently than those that its Environmental Protection Agency detects. Several jurisdictions have negotiated (The Netherlands, Denmark, Massachusetts) or are contemplating (Alberta, British Columbia) agreements with individual firms or industry sectors under which these sectors report on their environmental performance.

In the United States, for example, industrial emitters of 651 chemical substances must report their emissions annually to the federally administered Toxics Release Inventory (TRI). Established in 1988, the Inventory has become an essential source of information to the design of State-level pollution prevention programs. Although a policy initiative, the TRI has important governance implications because it has the potential to change the role of environmental protection agencies:

- The TRI establishes an information-rich context for private citizens, interest groups and firms to solve environmental problems.
- Environmental standards in the future could be set by what informed citizens will accept, not by regulatory agencies.
- Firms will adopt (higher) pollution prevention and abatement measures in response to public pressures rather than formalized agency standards or governmental sanction.

The TRI has also catalyzed popular campaigns that force environmental agencies to act against egregious polluters. Although the TRI has a weak monitoring and enforcement component, there are suggestions that the program has out-performed all other EPA regulations over the last ten years in terms of overall toxics reductions.

It was reported that many of the jurisdictions surveyed accredit private laboratories for the analysis of emissions data. For example, Massachusetts certifies commercial and municipal laboratories to perform routine compliance analysis and focuses its own analytical capacities on enforcement.

3. Policy setting

Policy development continues to be a core responsibility retained by government in most jurisdictions. However, there are differences based on the constitutional relationship between federal and state/provincial levels in different countries. For example, in New Zealand, Sweden, Norway and the Netherlands, agencies in jurisdictions at levels below the national government operate within a policy framework set by their respective national Parliaments in the form of a policy statement or a statute that establishes their respective roles and responsibilities.

In Canada and the US, this identification of roles and responsibilities is established in part by their respective constitutions. In the US, state environmental protection agencies operate within a very directive policy and regulatory framework established at the federal level and receive federal financial and technical assistance to discharge their responsibilities. In Canada, provinces exercise authority in some areas (e.g. industrial licensing), while the federal government has authority for others (e.g. import/export of hazardous waste.) Still other areas (e.g. pollution prevention) are shared. In practice, however, Environment Canada's authority to set national goals and provide strategic, policy, and program direction to the provinces is exercised in very limited manner.

Some countries (e.g., New Zealand, Sweden, Denmark and the Netherlands) more formally share the policy development function between levels of government, with the national ministry or agency setting the overall policy direction and regional or provincial authorities having the discretion to adapt it to their priorities. In Sweden and Denmark, semi-autonomous agencies also contribute to the development of environmental policy (e.g., the Swedish and Danish Environmental Protection Agencies).

Western Australia has established by statute the Environmental Protection Authority (separate from the operating agency – the Department of Environmental Protection). This Authority was established to be an independent advisory body, with a politically appointed Board, to develop policy proposals and provide policy advice to the Minister for the Environment, as well as conduct research and environmental assessments.

Although each of the jurisdictions reviewed use formal and in many cases, very extensive public consultation processes, including formal external advisory bodies, to develop policy, no jurisdiction fully delegated the responsibility for policy development to an external organization. Alberta, through its Clean Air Strategic Alliance (CASA) – is an example of partial policy-making delegation to a consensus-seeking multistakeholder body. This body, effectively a form of round table, which includes the Alberta government, is responsible for strategic air quality planning, priority-setting, resource allocation and plan development.

4. Standard Setting

Standard setting is most often a function of the national environmental agency, or a reflection of an overarching set of environmental standards that may include formal input from lower levels of government. In Sweden, overall environmental performance goals are outlined in the national environmental quality objectives. The Swedish national Ministry of the Environment, along with the county administrative boards, sectoral authorities, and municipalities, is responsible for developing the appropriate standards and targets in support of the national objectives.

The Netherlands and New Zealand have similar approaches whereby regional and municipal governments advise the central agency on the establishment of appropriate standards. In the case of the United States, broad standards are set by the federal Environmental Protection Agency, but individual states are required to adopt consistent standards that either meet or exceed those that have been established by the Federal Government.

In the Netherlands, the negotiation of long-term target sector agreements (the Dutch *covenants*) that describe abatement plans for various industry sectors has become the chief instrument to achieve the NEPP goals. These agreements are noteworthy on at least three counts:

- They have created greater policy coherence among government environmental protection efforts by forcing the relevant ministries of the national government, the provinces and the water boards to agree to a common agenda;
- They provide industry considerable latitude in achieving environmental protection objectives. Although the objectives are non-negotiable, this latitude gives industry groups an effective say in regulatory design;
- No other jurisdiction has gone as far as the Netherlands in the implementation of this model although there are examples of negotiated agreements in most of the jurisdictions we reviewed.

In several jurisdictions, some industry associations have developed voluntary codes of practice for their members. These codes can cover a range of issues, including environmental performance, public reporting and community consultation. In Canada, examples of these codes include the Canadian Chemical Producers' Association (CCPA) Responsible Care program (also applied in 40 other countries) and the Canadian Electricity Association's Environmental Commitment and Responsibility program. CCPA's code is a mandatory requirement of membership in the Association. Although voluntary codes do not represent an explicit delegation of government responsibilities to the private sector, they may pre-empt government regulation and encourage environmental protection authorities to focus their resources elsewhere. Where this is the case, they may represent *de facto* standard setting.

5. Technical Assistance

Jurisdictions that focus their efforts on environmental protection (or more specifically pollution prevention) tend to offer complementary technical assistance programs to assist with regulatory compliance and provide access to technological information. Prominent examples are New Jersey, Massachusetts, and US EPA.

Massachusetts, for example, offers technical assistance and municipal grants and loans to provide regulated companies and communities the tools necessary for environmental compliance. The California EPA has its California Environmental Technology Partnership program, which brings together agency officials with industry and NGOs, as well as the academic, financial and legal communities. The purpose of the program is to promote technical innovation, expedite regulatory acceptance and approval of new technologies, and to promote the export of California-based environmental technologies.

6. Environmental Assessment

Responsibility for environmental assessment varies greatly across jurisdictions. In Canada, environmental assessments are conducted internally by government agencies while public hearings for large projects or for appeals may be done publicly by an independent agency at the same level of government (e.g., the Environmental Assessment Office in British Columbia or Ontario's Environmental Assessment Board) on the basis of an impact statement prepared by the proponent. Assessments are also done in collaboration with other governments in different jurisdictions, as in Alberta, where the Ministry of the Environment forms partnerships with other provinces, territories or the federal government when conducting assessments. In the US, environmental assessment is a responsibility of the relevant agency (it prepares the impact statement).

New Zealand is at the other extreme: environmental assessments are done by the organization or corporation submitting the development proposal. The Ministry for the Environment's only function is to review the assessment reports upon their submission.

7. Inspections

Several different approaches were identified:

1. *The traditional model of government direct inspection:* Such inspections can be either the responsibility of the department or agency setting the standards (e.g., Alberta, British Columbia, New South Wales, California), can be performed by another arm, i.e. agency, of the same government (Sweden, Massachusetts) or delegated to another level of government (e.g., the Netherlands, New Zealand, Denmark).

   In New Jersey, the *County Environmental Health Act* authorizes the Department of Environmental Protection ("DEP") to certify local health departments and delegate its authority to conduct a variety of environmental programs in each state county, including:

   - Solid Waste Control
   - Air Pollution Control
   - Water Pollution Control
   - Noise Control
   - Hazardous Materials Emergency Response.

   Typical activities include complaint investigations; sample collection and analysis; routine inspections of regulated facilities; enforcement actions; and public information/education. Currently under review is a proposal to expand the scope of delegation to new programs (e.g. pesticides and underground storage tanks).

2. *Self-certification with government inspection/verification:* The Massachusetts Environmental Results Program (ERP) allows permitting with performance-based standards and whole-facility self-certification: facilities in three sectors (dry cleaning, photo processing, and commercial printing) are required to complete a self-certification checklist annually and submit it to DEP. For

industry, ERP provides greater flexibility to regulated facilities to make process changes. For government, ERP allows DEP to reallocate resources from permitting to inspection and enforcement.

Under the ERP, the Massachusetts DEP:

- Develops comprehensive performance standards in consultation with industry and the public to replace individual facility permits;
- Provides technical assistance to the industries in the program with comprehensive workbooks; and
- Provides compliance information, inspects, audits and takes enforcement action.

Top corporate officials must legally certify annually that they are in compliance with the standards.

3. *Certification of emissions data by third parties for small and medium enterprises (SMEs), and self-assessment and certification for major facilities (New Jersey Department of Environmental Protection):* This represents a partial delegation of monitoring and inspection to the private sector. Under this program:

   - NJDEP develops performance standards that apply to all emissions within a facility
   - Major facilities (expenditures over $25 million, or over 250 employees) are required to submit comprehensive Emission Reports to the DEP
   - Emission Reports from major facilities must be reviewed by an accepted Responsible Official prior to submission
   - SMEs must submit reports to the DEP that have been reviewed and certified by a third-party auditor. A list of auditors is provided by the DEP.

4. *Partial delegation of monitoring and inspection to the public:* Most US jurisdictions include the capacity for members of the public to launch lawsuits for environmental non-compliance, against the polluter, but also the state and federal EPAs. In California, the *Safe Drinking Water and Toxic Enforcement Act* (based on Proposition 65) actually provides a bounty for individuals who successfully launch prosecutions against violators. Although most other jurisdictions encourage the public to report environmental violations, they usually do not provide an economic incentive to do so.

8. Enforcement

In New Zealand, Sweden, Denmark, Norway and the Netherlands, the national environment ministry develops policies and sets standards but various local authorities have the primary responsibility for enforcement. These include: local regional councils, county administration boards, and municipalities. For its part, New Jersey has delegated some monitoring and enforcement powers to county health agencies certified by the State.

In the Netherlands, enforcement is primarily the responsibility of the provinces, the municipalities and the water quality management agencies. In 1997, the various enforcement agencies negotiated arrangements for strengthening their collaboration. These arrangements were incorporated in administrative agreements signed by all the provinces, covering methods of cooperation between the enforcement partners, priorities, and the exchange of information and reporting. For the most part, large installations are the responsibility of the provinces, and most of the SMEs are the responsibility of municipalities. In addition, an environmental police force with special courts and prosecutors oversees the enforcement of environmental laws and addresses issues related to persistent violators.

In Sweden, law enforcement is entrusted to relatively independent administrative agencies and 23 county administrative boards (regionally independent central government agencies headed by centrally appointed governors). The county administrative boards are responsible for monitoring, inspecting and enforcing the permits they have issued as well as those issued by the National Licensing Board for Environmental Protection. The 288 municipalities – which make up the 23 county administrative boards – are responsible for, among other things, monitoring the achievement of the national environmental quality goals.

In California, the EPA has recently delegated some enforcement activities to lower level authorities through the creation of local and regional task forces. The task forces are comprised of voluntarily participating federal, state and local agencies with enforcement or compliance authority, and dedicated to the deterrence, detection, investigation and prosecution of environmental violations. The task forces enable the development of partnerships between different law enforcement and regulatory entities, and facilitate the pooling and exchange of resources and intelligence. The task forces also embrace an integrated approach to environmental enforcement by simultaneously examining air, waste, water and other environment concerns.

Denmark stands out from the other countries in this survey for having established an Environmental Board of Appeal that can overrule decisions of both local authorities and national bodies, such as the Environmental Protection Agency. In the early 1980s, the Board overturned several decisions of the Environmental Protection Agency, acting as a counterweight to its initiatives (Andersen, 1997).

4. The Ontario Context

The Ontario Ministry of the Environment's current approach to governance is consistent with the approach of other Canadian provinces, in that most or all functions come under a ministry organization, reporting through a minister/member of the Cabinet.

Compared to many parliamentary jurisdictions Ontario's approach is very centralized. For example, Ontario currently does not delegate its core functions to other operating organizations, e.g. operational policy development, public consultation, standard setting, assessment, permitting inspection and abatement, investigation and enforcement. Ontario also has not created the range of environmental advisory bodies – for example, for research, technical, innovation, and/or policy advice – that we saw in many jurisdictions.

The exception to this centralization is the Environmental Assessment and Appeals Board, a quasi-judicial tribunal. With respect to assessment, the Board is empowered to conduct hearings and make recommendations with respect to undertakings where there is potential for environmental impact. The Board also hears appeals of director's orders, permit refusals, suspensions and/or cancellations, and terms and conditions attached to an approval.

Our observation and that of many participants in our review, is that this degree of centralization within MOE has contributed to the tendency of day-to-day operational pressures and requirements to dominate the time, attention, and resources of all parts of the Ministry and drive the overall Ministry agenda. Given limited resources, this tendency is one of a number of factors that impact negatively on the Ministry's ability to focus on building strategic capacity and dealing with long-term, crosscutting issues and concerns. Consistent with the benefits noted on page 106 of this section, the Ministry is also not benefiting from opportunities for greater independence in terms of regulatory/enforcement decision-making or flexibility/opportunity to engage stakeholders.

As suggested earlier in this section, whether a jurisdiction is functionally centralized or decentralized is not, in and of itself, an indication of high quality. Having said this, the Province of Ontario has a long tradition of creating and using other organizations as instruments of public policy implementation. This tradition includes:

- Strong legal and administrative policy frameworks that create and define delegated responsibilities to other levels of government, scheduled operating agencies, and external transfer payment organizations (e.g., social services agencies) to plan and deliver specific programs/services through professional staff under the direction of appointed and/or locally elected volunteer boards of directors.
- There are many examples of regulatory and other crown operating agencies – for example, the Alcohol and Gaming Commission of Ontario, the Liquor Control Board of Ontario, the Ontario Review Board, that undertake operational functions typically associated with departments of government. In some cases, these agencies are covered by the same general financial and administrative policies and procedures that are in place for line ministries. In other cases, they are more arms length and create their own administrative policies and funding arrangements.

6.0 Environmental Knowledge Management

1. Introduction

Our research indicates that a planned, enterprise-wide approach to Knowledge Management is critical to any jurisdiction's ability to implement the *strategic shifts* in environmental management that we have identified in this report. Therefore, a characteristic of a leading environmental management organization is one of heavy dependence on effective information and knowledge flows. Within this dependency, the role of the Knowledge Management plan is to focus on strategies that can lever the organization's knowledge and learning capacity in ways that assist with the achievement of these directions. It is clear to us – and to those we spoke with as part of our research – that in the absence of such a plan, the full benefits of the new directions may not be fully realized.

This notion of dependency carries over into our report and recommendations. From our perspective, Knowledge Management provides the direction setting and integrating framework for the various knowledge and information based activities explored in other sections of our report. Having said that, our research also indicates that, among the various specific areas of study incorporated in our review, environmental Knowledge Management is one that we would characterize as an *emerging* best practice. The reasons for this characterization will be described in this section of our report.

In addition to our discussions with officials from other jurisdictions and our own research and review of the literature, the ideas and information in this section are based on external research on Knowledge Management *(see Research Papers #5: Knowledge and Information Management Practices at Selected Public Sector Organizations, IBM Canada Ltd.).*

In this section of our report, we provide the following:

- Overall conclusions with respect to Knowledge Management in leading environmental and other organizations.
- Useful definitions and a conceptual framework for understanding the components of a Knowledge Management strategy.
- A discussion of how these definitions and framework apply in a public sector environment.
- Highlights of specific examples of practices in other jurisdictions and organizations.
- An assessment of the current MOE context with respect to environmental Knowledge Management.

2. Overall Conclusions

Our research and analysis supports the following conclusions with respect to Knowledge Management as a best practice in relation to environment ministries/departments:

- The new *information economy* and changing consumer/citizen expectations have significant implications for both the private and public sectors with new demands that these organizations develop systems that combine and share internal and external knowledge and expertise in the delivery of their mandates.
- The *strategic shifts* identified in our report are heavily dependent on a planned, comprehensive approach to acquiring, creating, adding value to, sharing, and using knowledge and information. This approach requires openness, transparency, and extensive external partnerships, in order to deliver on strategic and operational goals and targets.
- Knowledge Management continues to gain ground as an overarching strategic tool for improving business performance and delivering on results. However, in terms of implementation in the public sector, it

continues to be what we would characterize as an *emerging* best practice.

- There are few examples of public sector organizations that have implemented mature enterprise-wide Knowledge Management strategies. Our observation is that public sectors are generally aware of Knowledge Management frameworks and their potential/theoretical applications and benefits. However, few jurisdictions have had the time, resources, leadership, and/or strategic focus to adopt a comprehensive approach.

- Notwithstanding, many leading environmental jurisdictions have noted that successful implementation of their stated strategic directions is heavily dependent on various explicit or implicit approaches – most often partial approaches – to Knowledge Management. A number of these organizations are working towards an organizational culture, information technology environment, and external relationships that will enable effective and efficient Knowledge Management.

- Effective Knowledge Management needs to be driven by a clear environmental vision that reflects the critical role a Knowledge Management strategy plays in its realization. It also requires significant and sustained executive leadership from the various business units, supported by a strong Information Technology organization. In leading organizations, the senior leadership has:
    - Articulated the importance of Knowledge Management and its relationship to their business strategy and intended outcomes.
    - Implemented practices that are directed at sustaining a Knowledge Management environment.
    - Invested adequate resources to develop the human and technological capacity to create and manage knowledge.
    - Effectively engaged external audiences to foster and encourage new opportunities to create and share knowledge.

    - Positioned the public sector in a knowledge and information stewardship role rather than one of controlling information.

3. A Framework for Implementing Knowledge Management

The external research we commissioned provides a useful framework for organizations that wish to develop and implement an enterprise-wide Knowledge Management strategy. We would suggest that, in light of the strategic shifts that we have recommended in this review, this framework would be a useful starting point for MOE.

3.1.1 Useful Definitions

The framework begins by providing a number of definitions for critical terms that are often used incorrectly or interchangeably.

Defining Data, Information, and Knowledge

The following are the differences between data, information and knowledge – both internal and external – that organizations need to capture:

- *Data:* A record of a transaction such as a permit issuance, a registration, or an inspection.
- *Information:* A semi-structured message with a sender, a receiver, and an intent to inform, including two types of knowledge:
    - Explicit knowledge: knowledge represented in books, research papers, emails, and other documents.
    - Embedded knowledge: organizational understanding manifested in processes, products, and services, including transactional information such as number of registrations, permits issued, etc.

- *Knowledge:* Insights and context from the minds of individuals, i.e. ***what the knower knows***. This type of knowledge is typically tacit and is difficult to articulate or represent.

Organizing Data, Information, and Knowledge

With these definitions in place, the framework then turns to management practices, identifying three key types of practices that are often used interchangeably:

- *Knowledge management:* Strategies and processes for leveraging an organization's knowledge and learning capability for the purpose of increasing value and achieving business strategies. Including techniques to create, process, and manage knowledge: in effect, how the organization decides what to learn, how it learns, and how it leverages what it learns.
- *Information Management:* Provides the function or processes for the management of information capture, structure, delivery support, and maintenance, i.e. the informational support for knowledge workers.
- *Information Technology/Systems:* The technical infrastructure (architecture and tools, including data management) to enable and support information management and knowledge management.

3.1.2 Seven Framework Best Practices

Our external research presents the following seven framework elements or best practices for creating a Knowledge Management capacity within organizations.

Three Foundation Best Practices

The first three of these are particularly important for providing a foundation upon which other best practices are built. The purpose of this foundation is to ensure that the organization – management and staff – understand the value of knowledge and are, therefore, motivated to allocate time, resources, and effort to its creation and use in decision-making. Strong and sustained leadership from senior management is an especially critical success factor in putting these building blocks in place.

1. Linking Knowledge and Business Strategy
   - Senior managers are responsible for articulating the importance of knowledge and its relationship to the organization's business strategy and achieving business results.
   - The organization understands how its knowledge could be used to develop new value-added products and services or improve existing ones and has developed a set of tools for measuring knowledge outcomes.
2. Leadership Behaviours and Actions
   - Senior managers legitimize Knowledge Management by discussing the importance of knowledge creation, sharing and use in public forums.
3. Knowledge Transfer, Diffusion and Absorption:
   - The organization collects, disseminates and classifies explicit knowledge to reduce the time and effort to find knowledge artifacts.
   - The organization identifies and shares lessons learned.
   - The organization has mentoring/apprenticeship programs designed to transfer tacit knowledge.

Longer Term Best Practices

With the three foundation components in place, the organization should be well positioned to move on the remaining four elements, which cumulatively will provide for the long-term sustainability of the organization's Knowledge Management strategy:

4. Work Environment
    - Knowledge Management is an integral part of the work environment:
        - Individuals and groups are measured and rewarded for knowledge creation, sharing and use.
        - The organization actively promotes an environment that builds trust and social capital among individuals.

5. Organization and Resource Allocation
    - The organization has developed formal roles and responsibilities to facilitate knowledge creation, sharing and reuse.
    - The organization formally allocates money, time and space to enable individuals to create, share and access knowledge.
    - The organization identifies, creates and maintains communities of practice that drive the business strategy.
    - The organization identifies and uses knowledge intermediaries or *brokers* to support its operations.

6. Knowledge of Individuals and Groups
    - The organization identifies individuals and groups with relevant knowledge and makes that knowledge visible to the rest of the organization.
    - The organization understands and exploits the relevant knowledge used by high performing groups and individuals.

7. Knowledge About the Outside Environment
    - The organization identifies and employs external client knowledge across decision-making processes.
    - The organization identifies and employs broader sectoral knowledge across decision-making processes.

- The organization identifies knowledge from the scientific/environmental groups/jurisdictions and incorporates that knowledge into strategic and tactical decisions.
- The organization identifies and incorporates relevant knowledge regarding its joint ventures, alliances and partnerships.

4. Applying Knowledge Management in the Public Sector

Based on our research and experience, we would observe that Knowledge Management, although an established management tool in the private sector, is not generally well understood in the public sector. Among the most common misconceptions are:

- Confusion and lack of clarity with respect to the difference between data, information, and knowledge.
- A view that Knowledge Management is essentially about the Information Technology infrastructure needed to connect databases within and across organizations, i.e. the technical information infrastructure of an organization.

The purpose of this section is not to provide an extensive description and discussion of the application of Knowledge Management in a public sector setting. However, we do want to address the above-mentioned misconceptions.

Knowledge Management, simply defined, is a planned approach, enabled by information technology, to support business strategy with the comprehensive knowledge and information required to carry out that strategy. It involves an organization identifying the full range of knowledge and information that it needs to conduct its business, then acquiring, creating, adding value to, sharing, and using that knowledge and information in all of the various business processes.

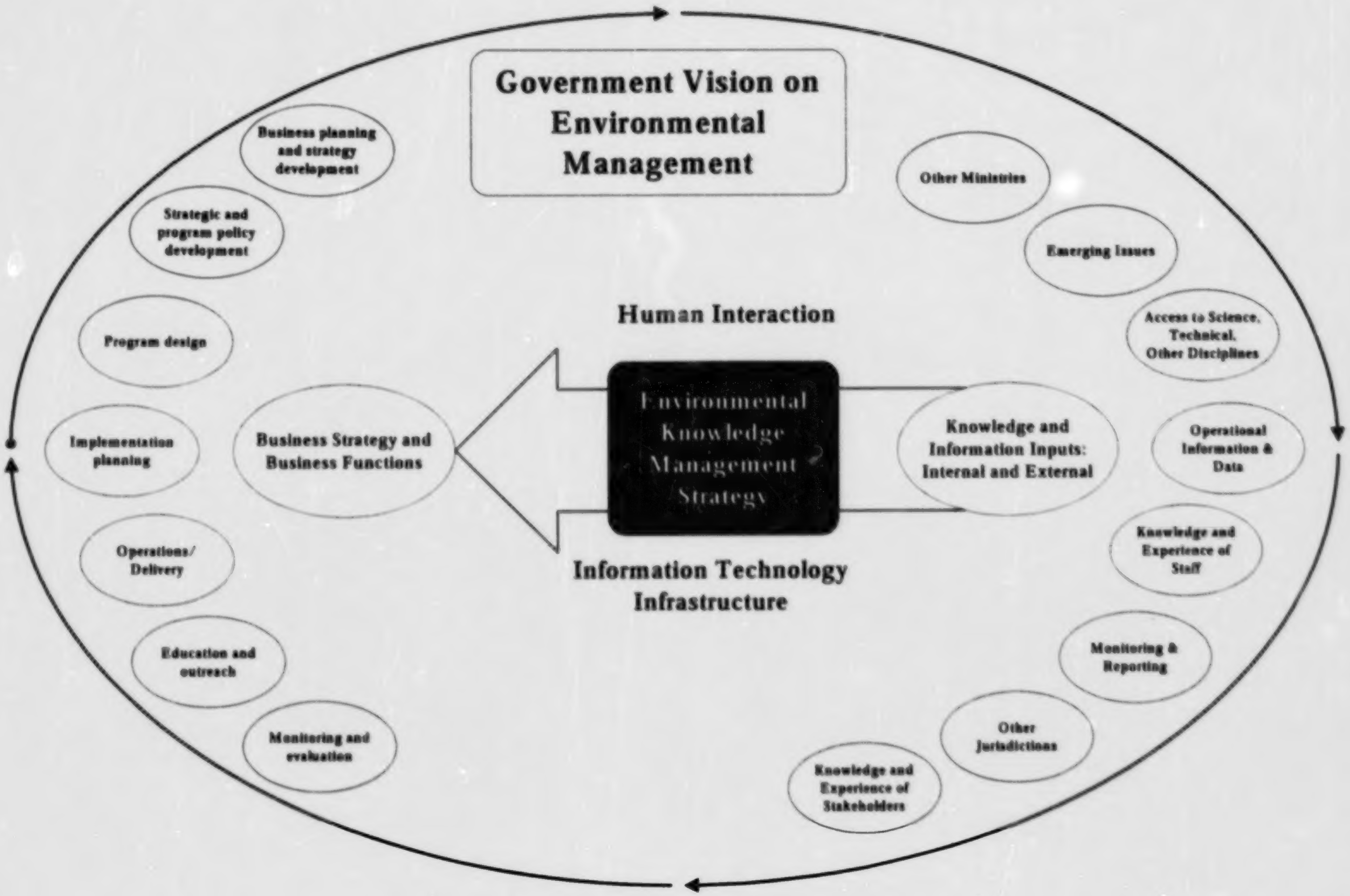
The diagram on the following page is an attempt to visually depict the role a Knowledge Management strategy plays in a public sector setting:

- The essential precondition is the government-wide vision as the overall strategic business driver. This vision provides the strategic context for ongoing knowledge and information activities. However, its initial creation is also informed and supported by broad, crosscutting knowledge and information.

- Knowledge and information inputs are broadly defined to include crosscutting internal and external sources. In the environmental context, this includes knowledge and information with respect to emerging issues, access to scientific and technical expertise, environmental monitoring information, operational and evaluation data, information about other jurisdictions, tacit knowledge and experience that exists within people, and knowledge and information from stakeholder organizations.

- The Knowledge Management strategy enables the vision and the ongoing business processes within the organization. In part through information technology, but also through human processes, the strategy identifies, defines, creates, acquires, makes accessible, and shares the knowledge and information required to achieve the organization's strategic and operational goals and to support the individual business processes.

- In the public sector, the business processes should include: strategic planning and direction setting, business planning and strategy development, strategic and program policy formulation, program design, implementation planning and implementation, operational policy development and delivery, ongoing performance monitoring and outcomes evaluation, and education/outreach.


Government Vision on Environmental Management
Other Ministries
Emerging Issues
Access to Science, Technical, Other Disciplines
Operational Information & Data
Knowledge and Experience of Staff
Monitoring & Reporting
Other Jurisdictions
Knowledge and Experience of Stakeholders
Human Interaction
Environmental Knowledge Management Strategy
Information Technology Infrastructure
Knowledge and Information Inputs: Internal and External
Business Strategy and Business Functions
Business planning and strategy development
Strategic and program policy development
Program design
Implementation planning
Operations/ Delivery
Education and outreach
Monitoring and evaluation

5. Other Organizations

As mentioned at the beginning of this section, we found few examples of public sector organizations that have implemented what we would call mature enterprise-wide Knowledge Management strategies, although evidence exists of organizations increasingly coming to grips with this need and the challenges that it presents.

In the following pages, we identify and discuss the varying stages of Knowledge Management and related practices in five organizations:

- Health Canada, as an example of a very clear, well-articulated and explicit enterprise-wide Knowledge Management strategy.
- US EPA, as an example of a large environmental organization that is, in many ways, very traditional and does not have an explicit Knowledge Management strategy. Notwithstanding, it is focused on the role of knowledge and information in achieving its business goals.
- California EPA, as an example of an environmental organization that in light of its new strategic direction has recognized the need to begin to take a more strategic approach to information.
- UK Environment Agency, as an example of an environmental organization that is in the process of developing an enterprise-wide Knowledge Management strategy, with a number of strong building blocks already in place.
- The World Bank as a non-environmental organization whose core business relies very heavily on Knowledge Management.

Health Canada

In 1998, Health Canada developed a formal, enterprise-wide Knowledge Management vision and strategy. This document (*see Appendix I*) sets out a comprehensive approach to Knowledge Management for the organization and beyond that incorporates all of the elements of the framework presented earlier in this section and in *Research Paper #5.* We think it is a good example of a formal, publicly articulated, and strategic approach.

The Health Canada initiative is part of a larger federal cross-department initiative to improve knowledge and information management capacity. It was developed out of an initiative originally established in the mid-1990s by the Clerk of the Privy Council that looked at strengthening policy, analytical, and research capacity in the Government of Canada. (*For more information, please see Section 11.0 Policy Development as well as Research Paper #13.*) The major focus of this project was on identifying and acquiring the knowledge and information required to support analysis of major crosscutting issues facing the federal government.

The formal strategy document starts by articulating the current limitations within Health Canada:

> *At Health Canada, we do not:*
>
> - *Know what our employees know.*
> - *Know what information we have.*
> - *Know what information we need.*
> - *Have a coordinated approach to the capturing of employees' knowledge.*
> - *Have a guiding blueprint for investments in knowledge, information, applications or technology.*

Consistent with best practice in this area, the Health Canada strategy developed was rooted in the overall business planning priorities of the department. The fifth of six priorities in the department's business plan stated the following: *To enhance the equality and availability of health information and knowledge for decision-making.* Decision-making in this context refers to the department, but also to service providers, the public, academia, and other stakeholders. The business plan went on to acknowledge that improved knowledge and information is a requirement for achieving each of the other five priorities.

Drawing on the direction in the business plan, the Department created a specific Knowledge Management Vision:

> *Health Canada analyses, creates, shares and uses knowledge strategically to maintain and improve the health of the people of Canada in the following ways: through its knowledge management processes and strategies, which are tailored to advance the business lines of the department; as a model knowledge organization; and as a leader, facilitator and partner, in the development of a Canadian health infostructure.*

In addition to a vision-based foundation, Health Canada's approach includes many, if not most, of the features of our proposed framework. These include:

- Senior management leadership through the creation of a Chief Knowledge Office at the Assistant Deputy Minister level, a Health Information Strategy Steering Committee, and a Knowledge Management staff secretariat to support the initiative.
- The creation of communities of practice and Internet-based discussion forums.
- Tools, frameworks, methodologies, publications, seminars, conferences, etc.
- The creation of knowledge business specialists throughout the organization to support knowledge management activities and to ensure created knowledge is captured, accessible, and shared.
- The identification of broad external partnership opportunities, including significant investment in the knowledge and information capacity of stakeholder organizations, to create what Health Canada calls *infostructure*.

- Identification of necessary technology supports internal to the department, but also in the external stakeholder community, including architectures, IT infrastructure, and IT/IM tools.

The emphasis on building the knowledge and information capacity of external stakeholders is particularly noteworthy. According to 2000 federal budget documents, investment in this broader community will total $366 million over the next four years. Already approved projects include:

- A wide range of initiatives in partner organizations such as hospitals, research and academic organizations, and community health agencies, such as:
    - Putting local community health information on-line through developing internal and public access information websites.
    - Developing database capacity in stakeholder organizations.
    - Creating local decision-support systems.
- The creation of the Canadian Health Network, a large on-line network/website, funded by Health Canada, that provides public access to the information resources of more than 600 NGOs and other stakeholders, including research institutes, community information services and networks, advocacy organizations, survivor groups, service providers, libraries, colleges and universities, and government departments.
- The creation of a formal National Health Surveillance Infostructure that addresses the more technical information management underpinnings, including:
    - Projects to develop common architecture and data standards internal and external to government.
    - Developing a central portal capacity under Health Canada so that the public and stakeholders can access both internal and external information.
    - Developing inventories of existing data and information.
    - Creating document libraries.

US EPA

US EPA is an example of an environment organization that does not have a formal Knowledge Management strategy. The organization struggles with what we would describe as fairly typical information management challenges for a large public sector organization: different systems, lack of common data standards and data definitions, non-interoperable technologies, data organized by program silos, etc.

Furthermore, US EPA has been widely criticized for what are described by the US General Accounting Office as "extensive gaps" in data and information that, to date, have prevented the Agency from achieving its stated goals of identifying environment trends, establishing and monitoring environmental performance indicators, reporting on the effectiveness of EPA program outcomes, and assessing human and ecosystem risks. These challenges are further complicated by the fact that much of the compliance activity in the US actually occurs at the state level and is reflected in state information management systems that are facing similar challenges.

Notwithstanding this lack of a formal Knowledge Management strategy, our assessment is that US EPA, for all its information problems, is an organization that has clearly recognized the importance of strategic knowledge and information management to deliver on its vision and has many best practice elements in place. In particular, at the operational level, it has a strong institutionalized approach to developing knowledge and information in each of its activities. This includes involving NGOs and other external stakeholders in knowledge and information creation, as well as using web-based technology to provide broad public access to what is created.

Consistent with best practice, the starting point for US EPA is the vision. The overarching vision of the Agency – clearly articulated in most of the agency's high level planning documents – is very consistent with the strategic shifts that we identified in Section 2.0 of this report, i.e. struggling to move away from a sole focus on traditional command and control towards more comprehensive and innovative approaches that address place-based, multimedia, and cumulative impacts on human and ecosystem health. As with Health Canada, the Agency acknowledges that a more strategic and comprehensive approach to knowledge and information management is a key enabler for this overarching vision and specific goals and strategies.

The vision also specifically identifies broader public access to pollution performance information (individual polluters and cumulative impacts) as a means to lever continuous improvement and engage the public in what it refers to as "environmental stewardship". A central component of US EPA's strategy is to ensure that its stakeholders – the regulated community, NGOs, and the public – have the knowledge and information they need to make informed decisions that are in the best interests of the environment. Goal 7 of the Agency's strategic plan, entitled *Quality Environmental Information* describes this approach:

> *The public and decision makers at all levels will have access to information about environmental conditions and human health to inform decision-making and help assess the general environmental health of communities. The public will also have access to educational services and information services and tools that provide for the reliable and secure exchange of quality environmental information.*

When we met with senior management of the organization, we were impressed by the explicit linkages that they made between this overarching vision and the role of Knowledge Management as a key enabler. The strong message was that the ability to achieve the vision would be heavily dependent on a different approach to generating, sharing, and reusing knowledge. However, to date US EPA has not adopted the kind of comprehensive strategic approach developed by Health Canada.

Rather, its approach has been more piecemeal and focused on more immediate priorities. The work plan of US EPA's Office of Information, which oversees activities in this area, identifies three sets of priority projects:

- Addressing the data incompatibility, interoperability, accuracy, and gaps and to strengthen the use of data in outcome/performance measurement

- Increasing public access to and ability to use environmental data and information, including further public access to databases and software modeling and analysis tools.
- Dealing with the internal Agency IT infrastructure support issues such as developing common standards, architectures, hardware and software technologies, and security.

Having pointed to a number of limitations that exist within the Agency, we also want to draw positive attention to the Agency's current approach to and existing capacity for developing and sharing knowledge and information. With the limitations already referred to, the practices in US EPA were impressive and met many of our tests for a best practice organization. This approach includes:

- A well-developed and resourced research and development function (see Section 9.0 of our report for more information) that includes extensive partnerships with external research and academic organizations to create knowledge and provide peer review/quality assurance on internal knowledge creation.
- A highly developed capacity via the Internet to share knowledge, information, and data with the public stakeholders and to link to and integrate information provided by stakeholder organizations and other partners.
- A public access, on-line Library system with related databases for:
    - The National Center for Environment Publications (7,000 publications currently on-line).
    - The Environmental Financing Information Network, including abstracts, case studies, and contact information on environmental financing.
    - The libraries of US EPA's National Enforcement Training Institute, the Subsurface Remediation Center, and the Agency's 28 regional offices.
- An internal, Intranet based library network for internal staff which includes access to:

  - Full texts of 400+ scientific and policy journals, reports, newspapers, reference works, and databases.
  - Access to the tables of contents and abstracts for the articles in 1,000+ scientific journals.
  - Internal research service staff attached to each of the 28 regional libraries.

- The creation of communities of practice across the organization for specific issues and areas of expertise.
- Extensive preparation and electronic sharing of internal reports, analysis, and advice on a full range of environmental research, technical, and management issues.
- Wide open public access to extensive media and geographic databases such as the *Toxic Release Inventory* as well as software analysis and modeling tools, so that the public, NGOs, and other stakeholders can conduct their own analysis of the data, with particular emphasis on citizens accessing environmental performance data for the community/geographic area in which they live.
- A wide array of outreach programs specifically targeting the public and the regulated community for potential partnerships, and information transfer, including mentoring programs for small businesses and bringing potential environmental technology users together with experts through workshops.
- The creation of compliance assistance networks by sector to encourage a partnership approach to generating and sharing knowledge and information.
- Grants for innovative pilot projects that create new ways to publicly share information between local, state, and federal governments, research institutions, NGOs, the private sector, and/or the Federal Government.

UK Environment Agency

While this Agency does not currently have a formal Knowledge Management strategy for the organization, formal development work is underway. Consistent with our proposed framework, the driving force is the government's vision and political direction. More formal approaches to Knowledge Management – "smarter knowledge management across government, which increasingly enables government to harness its data and experience more effectively and work in new ways" – are part of the government's strategic direction for all departments. This direction has found its way into the Agency's own environmental strategy which stresses:

- The need for a "shared knowledge base to support working with external organizations".
- Promoting "a common understanding of what all of us can contribute in terms of resources, skills and technology.
- Strengthening "links with the best external sources of knowledge".

To date, an internal Agency advisory group has reviewed developments in other jurisdictions and organizations and has recommended an approach to senior management for the development of "practical tools, behaviours and policies, which taken together maximize the exploitation of the Agency's explicit and tacit knowledge and expertise".

This approach includes a recognized and stated need to change the organization's culture from "knowledge hoarding" to "knowledge sharing" and, consistent with recognized Change Management practice, the creation of internal champions for the initiative. One of the early activities and, from our perspective an appropriate starting point, is to analyze the Agency's current knowledge base and processes, current and future requirements, and gaps.

This initiative builds on an apparently solid foundation already in place within the Agency through its formal Research and Development Strategy. This approach is described in Section 9.0 of our report and is provided in *Appendix H.* As noted in that section, the Research and Development Strategy – which will become a component of the larger Knowledge Management strategy – also incorporates most if not all of the recommended features of the proposed framework, including solid grounding in the vision and business plans of the organization.

California EPA

When we met with senior officials of the California Environmental Protection Agency (Cal/EPA), they acknowledged that knowledge and information management is a significant challenge for their organization. This area was included in an external review of the Agency conducted in early 2000 and was the subject of considerable criticism.

A major contributing factor is the fact that their organization is fragmented into six separate Boards and Departments that, according to the head of the Agency, are "largely independent". Each of these organizations collects and separately stores its own data for its own purposes, and has its own IT unit each headed by a unit CIO, with separate goals and structures, different database technologies, and supporting hardware and software platforms. As a result, the Agency has no capacity to aggregate and share information across its Boards and Departments and, as a result, does not have adequate information to understand the impact of some types of decisions. Furthermore, integrated data are not made available to the public through a single source such as an Agency website.

The California EPA is included in our report, however, not for the progress they have made, but rather as an organization at the starting point of Knowledge Management given that efforts are only now getting underway. As with the other organizations we have included, that starting point is a clear vision of environmental management in the future and the essential role that knowledge and information management must play in achieving that vision. Cal/EPA's strategic vision states the following:

Two tenets underlie this strategic vision for the opening years of the 21st Century:

- *The need for improved cross-media coordination in addressing environmental challenges.*
- *The requirement that we never lose focus on measurable environmental results.*

Senior management has recognized that to be successful, this approach requires the organization to leverage to the extent possible "all that is known about science, ecology, economics, and development". The agency has identified an improved capacity to provide, manage, and disseminate information, including better collaboration with stakeholders and public access to information, as a formal management priority. The language the Agency has used to elaborate on this priority is very consistent with the strategic shifts we identified earlier in our report and with similar views expressed by US EPA and other state EPAs:

> *We live in a knowledge-based society. The astonishing increases in productivity accompanying the new tools of information management and dissemination provide opportunities to acquire and apply scientific and engineering knowledge that we did not have in earlier decades. Cal/EPA will structure its organization, information management, and technological resources so that researchers, applied scientists, engineers, program managers, and the public will have access to environmental information from California and around the globe.*

Finally, this management priority has been translated into a specific performance objective for the current planning cycle: *To create an Internet-based, agency-wide, integrated information management system that is accessible to the public.*

In support of this objective, Cal/EPA recently appointed a Chief Information Officer for the Agency as a whole who will lead the development of overarching Agency action steps required to achieve the above mentioned performance objective. One possibility that has been identified is the creation of a single agency structure for information management to support all of the Boards and Departments. Other current broad Knowledge Management-related commitments in this area include:

- Further development of a Geographic Information System that will plot environmental performance information by geography and allow citizens and NGOs to track current status/performance in local communities.
- Creating different information to allow it to move from a single media reactive approach to a cumulative impact/cross-media approach based on partnerships with internal and external stakeholders.
- Increasing public access to environmental information not only from California, but other jurisdictions as well.
- The use and funding of external advisory and research organizations to create new information and knowledge.
- Providing grants and other incentives to outside organizations that create and share leading practices in environmental management.
- Making a commitment to public and industry education and outreach to enable these groups to take personal and corporate responsibility for environmental improvement.

World Bank

Although not specifically an environmental organization, we included the World Bank in our research for two reasons:

- The World Bank has extensive programs focused on providing support to effective environmental management around the world.
- The World Bank is a good example of a knowledge-based organization and has made extensive progress towards implementing enterprise-wide Knowledge Management.

The World Bank's progress in this area appears to start with its understanding of the critical linkage between business strategy and knowledge strategy. Part of the organization's management philosophy is that information should flow extensively across internal and external boundaries. The organization describes this approach as "explicitly external".

The World Bank's stated objective is to make expertise and experience accessible not only internally but also externally to clients, partners, and stakeholders around the world. The organization has a highly developed and explicit Knowledge Management strategy in place to enable it to achieve this objective. Examples of specific initiatives include:

- Directories of expertise, i.e. a *Who's who* indicating who knows what.
- Advisory services, and help desks in specific subject areas directed at providing clients with information, i.e. small teams of experts to whom one can call to obtain specific know-how or help in solving a problem, and linking these small teams to external information and information partnerships.
- Creating knowledge/research networks and communities of practice in specific thematic areas of expertise, including the development of specific work objectives for individual communities of practice.
- Embedding knowledge sharing into the formal performance evaluation system for employees, with every employee being formally responsible for creating knowledge.
- Capturing the knowledge of individuals, i.e. of stories, experiences, and lessons through the use of electronic forums.
- Encouraging partnerships with external organizations that are committed to sharing information.
- Funding and promoting knowledge and information sharing pilot projects, conferences, and workshops.
- Funding extensive external research and evaluation activities through partner organizations and ensuring public access to the research and results.
- Creating web-based forums for storing, sharing, discussing, and modifying knowledge and information from internal and external sources on a range of issues.

- Formally budgeting resources to Knowledge Management activities, i.e. 80 percent of the allocation to knowledge creation and 20 percent to infrastructure to support its sharing and use.
- Supporting clients to tap into and learn from on-line resources, both internal and external to the World Bank.

6. The Ontario Context

Over the past 15 to 20 years, most public sectors, including Ontario's, have tended to emphasize the importance of information and data, as opposed to the ability to create, manage, and use external and internal knowledge. This has been the result of a lack of leadership attention in this area, ongoing constraints and an emphasis on protecting program delivery, as well as limited investments in technology. The outcomes have been a diminishing of real capacity and general trend in Ontario and elsewhere towards a devaluing of the legitimate role of the public service to build a strong internal and external knowledge creation, analysis, and synthesis capacity and to demonstrate leadership in the creation and dissemination of knowledge and information.

This devaluation has been partly characterized by a steady erosion of historic links to the research community, including academic and other research organizations, to the point that such links are almost non-existent today. In its ideal form, this capacity would involve both internal and external sources and encompass a wide range of public issues, including, but not limited to, any particular government's agenda.

Our analysis and discussions with Ministry officials and external organizations indicates significant gaps within the Ministry in the knowledge and information required to support broader, crosscutting policy development and leading edge business strategy development and implementation.

Furthermore, and perhaps more significantly, there are gaps in the Ministry's present ability to acquire and manage that knowledge and the knowledge development process for the future. These gaps include:

- Defining the overall Vision for the environment and the business strategies required to support that Vision, including the role that Knowledge Management plays in achieving that vision.
- Defining crosscutting and program specific knowledge and information requirements necessary to implement the business strategies.
- Matching those requirements to a dedicated source(s) of funds.
- Conducting research, gathering information, and synthesizing this knowledge within the Ministry.
- Building knowledge partnerships with external stakeholders, including sharing and purchasing research, information, and synthesizing capacity from sources outside the Ministry.
- Packaging and disseminating knowledge and information, including research results.

Over the past two years, MOE made use of external consultants to examine the possibility of adopting a strategic approach to Knowledge Management. The design principles and potential strategies that resulted are quite comprehensive and very consistent with the elements of the framework presented earlier in this section. However, the initiative as originally conceived has not moved forward within the Ministry. Our overall impression is that the Ministry was somewhat overwhelmed by the magnitude of the challenge, in light of a number of contributing factors:

- The need for an overall government commitment to and strategy for Knowledge Management that would provide the larger context and approval for the allocation of the resources required for implementation.
- The need for a broader vision of environmental management – incorporating notions of transparency, shared responsibility, and

partnerships – that requires and compels a strategic approach to environmental Knowledge Management.

- A lack of continuity and sustained leadership at the senior executive level within the Ministry, including high turnover.
- The cultural emphasis within the Ministry on program silos, operational challenges, and managing day-to-day issues and crises.

In light of these challenges, the Ministry has focused time, effort, and available resources on the *Environet* information management strategy. The Ministry has identified this strategy as one that focuses initially on internal information management for program delivery and decision-making and for the external provision of information related to compliance.

Our assessment is that the Ministry's description is accurate. *Environet* in its current form is an information technology plan and not a Knowledge Management strategy. It is made up of a series of program delivery-focused information and information technology initiatives that will, in the short term provide significant operational benefits for the Ministry. Understandably, *Environet* was developed to facilitate the Ministry's current traditional way of doing business, as opposed to enabling it to deal with the *strategic shifts* identified earlier in our report.

This last point is significant. While the *Environet* project is not inconsistent with a larger Knowledge Management strategy, significant leadership and resources would be required to broaden the effort and to position the Ministry effectively to align itself with the *strategic shifts.* As noted at the outset of this section, Knowledge Management provides the vision and integrating framework for the various knowledge and information creation activities required to make Ontario a leading environmental jurisdiction.

7.0 Emerging Issues

1. Introduction

In Section 6.0 of this report, dealing with Knowledge Management, we identified an Emerging Issues process as an important building block of an Environmental Knowledge Management strategy – itself a critical element of a leading approach to environmental management.

However, our review also suggests that the institutionalized use of formal tools for identifying and addressing emerging issues should be included among those that we would characterize as *emerging* best practices in leading jurisdictions. The reasons for this characterization will be more fully described in this section of our report.

The ideas and information in this section provide a synthesis based on our discussions with officials from other jurisdictions, our own research and review of the literature, and external research on emerging issues frameworks undertaken for this project. *(See Research Paper #6: Emerging Issues and the Ministry of the Environment, P. Victor, E. Hanna, J. Pagel, York University.)*

The section is presented in three sub-sections:

- Overall conclusions with respect to the current status, significance, and role of emerging issues frameworks in environmental and other organizations.
- Highlights of specific examples of practices in leading jurisdictions drawn from the research.
- An overall assessment of the current MOE context with respect to emerging issues.

2. Overall Conclusions

Our research and analysis supports the following conclusions with respect to frameworks for identifying and addressing emerging issues as a best practice for environment ministries/departments:

- Leading organizations utilize some form of *foresight* process for the systematic and regular assembly of views about possible new issues. They prioritize the issues based on explicit criteria, focus management decision-making based on this analysis, and identify new policies and programs, monitoring, and research that might be required.
- There is a consensus that a process of this nature provides for earlier and more effective preventative and remedial action and for better management and investment decisions for scarce policy, operational, scientific, and research resources, as well as enhanced marketing opportunities for new products, services, and technologies.
- In the absence of this kind of process, there is the potential for fragmented single disciplinary approaches to dominate an organization's thinking, resulting in lost policy and economic opportunities.
- Most environmental organizations have in place some form of approach to identifying emerging issues, although these are usually more informal, less structured and not always clearly tied to overall business goals and strategies.
- Although there is extensive literature that notes the value of an emerging issues process for strategic planning, environmental scanning and futures analysis, environmental organizations have not generally implemented systematic approaches. In addition, very little information exists with regard to specific procedures for identifying and responding to emerging issues.
- To be successful, a systematic approach to identifying and addressing emerging issues requires:
    - Strong senior management leadership.

- An understanding across the organization and external to the organization of the value of the process and the use of the outcomes in terms of strategic business planning, policy development, and operational planning.
- An approach that is institutionalized in the organization, including broad involvement within the organization, a significant investment of time, effort, and assigned resources to develop, implement, and sustain the process.
- Clear connections to the major activities of the organization.
- Constant evaluation of the effectiveness of the contribution made by the outcomes of the process and communicating this to the organization and also external stakeholders and partners.
- Particularly in the public sector, a culture of transparency, including public access to information and stakeholder participation.

3. Major Findings

This discussion of major findings is presented in three parts:

- An overview of a conceptual approach to identifying and addressing emerging issues.
- A discussion of conceptual approaches to emerging issues identification and examples from other jurisdictions and organizations.
- An overview of desirable characteristics for a foresight/emerging issues process based on lessons learned from other jurisdictions and organizations.

3.1 Conceptual Approaches

Research Paper #6 presents a useful conceptual approach for:

- Defining an emerging issue.
- Classifying emerging issues into different types.
- Defining a lifecycle for emerging issues.
- Recommended features of an appropriate process for dealing with emerging issues.

Defining Emerging Issues

An emerging issue can be defined as an issue which is not yet generally recognized, but which may have significant positive or negative impact on human and/or ecosystem health over the next 20 plus years. Emerging issues can arise or be associated with one or more of the following:

- Political, social, economic, financial, institutional or technological developments that may cause changes in current trends of human activity leading to environmental change;

- New evidence or theory which suggests potentially large environmental change, but which is currently either not widely accepted, or is considered unproven;
- Lack of adequate policy, action or leadership on an existing issue that may become more significant or urgent in the future.

Different Types of Emerging Issues

In general, there are many different types of issues. A useful emerging issues procedure should be able to identify issues of different types, including the following classifications:

- *Unforeseen issues:* New issues that appear without warning (e.g. stratospheric ozone depletion caused by the release of CFCs into the atmosphere).
- *Unexpected events:* Events known to be possible but their severity, timing and location is unanticipated (e.g. large oil spills, accidental poisonings, severe smog and air pollution events, biological invasions).
- *Emergence of new findings:* Existing issues brought into new light by new developments or findings or by media involvement (e.g. concern over pesticides and herbicides triggered by publication of Silent Spring, discovery of toxics in the Love Canal, discovery of contaminants in the Arctic, acid rain).
- *Changes in progression of trends:* Deviations from the expected course of events that are ecologically and/or economically harmful (e.g. climate change).
- *Shifts in environmental perception:* The way in which environmental issues are viewed can change remarkably rapidly (e.g. attention moves from local to national to international issues).

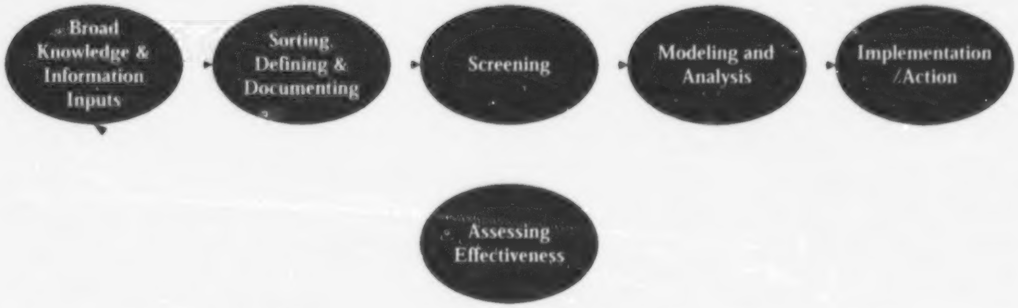
Emerging Issues Life Cycle

It is suggested by the research that all emerging issues pass through a sequence of four phases, each of which calls for a different response:

- *Horizon Phase*: The point at which issues have been identified, but have not yet evolved to the extent that their implications and potential impacts can be determined.
- *Concern Phase:* The development of a management strategy beyond information gathering is triggered when indicated by one or more criteria of concern such as: scientific consensus forming, substantial public concern, potential for serious risk, appearing in multiple jurisdictions, availability of appropriate response. The management response should be linked to the characteristics of the emerging issue.
- *Action Phase:* Incorporating the issue into the full formal policy formulation stage as a current issue.
- *Retrospective Stage:* Issues that return to an earlier phase of an issue, to begin the cycle all over again, and or represent issues with trailing edges.

Recommended Components

The primary components of an appropriate emerging issues process for an environmental department are consistent with the principles underlying our *strategic shifts*, as well as the approach to Knowledge Management described in Section 6.0 of this report and reflected in our recommendations. These principles include: building partnerships, broad inclusiveness, and an emphasis on access to and transparency with respect to knowledge and information.


Broad Knowledge & Information Inputs
Sorting, Defining & Documenting
Screening
Modeling and Analysis
Implementation /Action
Assessing Effectiveness

- *Broad knowledge and information inputs:* Including internal and external sources; incorporating outside expertise and advice and cutting across ministries/departments; a wide range of data and analysis.
- *Sorting, defining and documenting:* Synthesizing all of the inputs into clearly defined issues sets.
- *Screening:* Analyzing and establishing the relative importance of the various issues, including the use of an outside expert panel for validation.
- *Modeling and analysis:* More detailed analysis of the agreed upon issues, including scope, severity, probability, and costs/benefit.
- *Implementation/taking action:* Integrating the products of this process into strategic and operational business decision-making and assigning resources/taking steps – e.g. research, new policies or programs, or other actions – that might be required to address the issues.
- *Assessing effectiveness:* Assessing whether the actions taken as a result of the process, i.e. implementation, had the intended result; using that information to inform the next cycle of emerging issues planning.

3.2 Examples from Other Jurisdictions/Organizations

In our earlier discussion of overall conclusions, we noted that most environmental organizations have in place some form of process for identifying emerging issues. Although there is extensive literature that establishes the value of an emerging issues process for activities such as strategic planning and business planning, environmental organizations have not generally implemented systematic approaches that are integrated into the major business activities of the organization. There is a tendency to rely on informal and/or ad hoc approaches.

The New Jersey Department of Environmental Protection is an example of one such organization. The Department currently does not have a formal procedure or policy for identifying and priorizing emerging issues. In its place is a more informal process that assigns to the Agency's Science Division a general responsibility for tracking science issues nationally and internationally and monitoring overall stakeholder and public concerns. Division officials reported that depending on the issue, the Division will develop more detailed descriptions and responses, sometimes in collaboration with other parts of the organization.

Environment Canada also does not use a formal foresight or emerging issues process. The department does develop research papers from time to time that provide views with respect to specific future issues. However, priorities appear to be set through more traditional internal government decision-making processes.

The US EPA is an example of an organization that has developed an awareness of the need for a more structured and formal emerging issues process, but has been struggling with how best to move forward. For several years, the Agency's Science Advisory Board, established to provide independent external scientific and engineering advice to the EPA Administrator, has been advocating for a more formal approach for identifying and addressing emerging issues.

In 1995, the Board published its *Beyond the Horizon* report that recommended a more formal approach including extensive external stakeholder, expert, and public involvement and input. In making this recommendation, the Board acknowledged that such a process would likely further expose the agency to criticisms that it is not moving fast enough on some emerging issues or that it is, in fact, moving too quickly on others that remain as yet unproven. However, it concluded that the considerable economic (as the costs of solving problems are reduced), environmental (as environmental losses are avoided), and social (as environmental debts are not passed on to future generations) benefits outweigh the risks to the agency. More recently, US EPA established an agency-wide Futures Network, representing an informal linkage among people for sharing information, planning, training, and scenario building. The US EPA has developed an internal plan that would allow it to act more formally on the Science Advisory Board's 1995 recommendations.

The UK Environment Agency uses its formal Research & Development strategy to inform and support their activities to identify emerging issues. A component of this strategy is research that is described as "far-sighted", directed at anticipating future environmental risks and addresses the drivers of environmental change.

Stepping outside the environment field, and turning from anticipating environmental risks to identifying environmental economic opportunities, Japan's Ministry of International Trade and Tourism has in place a well-developed *futures* process that is directed at identifying emerging economic opportunities for Japanese businesses. The process is undertaken on five-year cycles and involves extensive external input and partnership between the government and the private sector. This process is credited by researchers as having contributed significantly to the ability of Japanese industry to exploit new technology in advance of competitors in other countries.

The Japanese example was adopted in the 1990's by the United Kingdom as the basis for its Technology Foresight Programme. Again, the process involved extensive public input from the scientific and business communities, focusing on fields of research that would likely yield new products and target markets. The British process was led by a steering committee involving broad representation, reporting back to participants, and ongoing revisions based on participant feedback as part of developing a consensus.

A third, non-environment field example is that of the Shell Group of companies, which includes Shell Canada. The company reports a strong commitment to future scenario development and indicates it has been doing so for more than 20 years. In addition to the business benefits of this type of planning, Shell points to a number of organizational benefits:

- Helping individuals adjust their mental map and truly think outside the box.
- Improving a management team's ability to manage uncertainty and risk.
- Reducing the level of "crisis management" and improved management anticipation.
- Increasing breadth of vision and ability to spot change earlier.

3.3 Desirable Characteristics: Lessons Learned

Research Paper #6 points to a set of lessons learned with respect to desirable characteristics of emerging issues or foresight processes, based on a variety of research, academic, and other jurisdiction sources. From our perspective, these lessons are very useful in terms of potential actions to be taken in Ontario. The information is presented in four categories:

- Purposes and goals
- Scope
- Methodology
- Implementation.

Purpose/Goals

- Ensure that there is a common understanding at the outset of the purpose and limitations of a foresight exercise as part of the decision-making and policy development process.
- The process of thinking about the future is as important as the results.
- Make goals and, where possible, values explicit.

Scope

- The foresight exercise should include not only future problems, but future opportunities, new developments and setting agendas for action.
- Do not constrain foresight strictly to the present mandate of the organization.
- A time horizon of up to 20 or more years is desirable, identifying immediate, but also intermediate and long-term emerging issues.
- Draw from a wide range of sources to help ensure that a broad net is cast (i.e. databases, models, experts, other institutions).
- Be global in scope without sacrificing attention to national, regional and local issues.
- Encourage rather than repress imaginative views of the future that may seem unrealistic today but may nevertheless represent real threats or opportunities.

Methodology

- Anchor foresight in science.
- Employ more than one potential issues identification method to improve results, and to provide different opportunities for involving stakeholders.
- Be quantitative, wherever possible, to facilitate analysis.
- Recognize many futures are possible and the conditions that actually emerge are likely to be the product of a huge number of large and small changes and decisions that aggregate in a way that is unknown yet may create vastly different prospects.
- Be tolerant of errors and omissions since no analytic method will eliminate the uncertainties of the future.

Implementation

- Involve outside scientists and experts.
- Cast the stakeholder net as widely as practical.
- Include a public participation process.
- Consider institutional arrangements for foresight, particularly to ensure credibility, strengthen internal champions, and promote inter-departmental collaboration.
- At the outset, establish measures of success for program effectiveness.
- Operate in a continuous rather than a "one-shot" mode.
- Have an institutional memory, so that suggestions that are made today for lack of data or interest can be reassessed in the future.

- Be subject to scrutiny by people outside of the process to help avoid the introduction of institutional biases.
- Link to and provide information to other activities of the Ministry; e.g. an effective early warning system should trigger R&D activities and should provide an important foundation for Ministry planning.
- Report periodically on principal findings about prospective threats and opportunities to inform the provincial agenda and stimulate discussion about priorities and policies.

4. The Ontario Context

As with many other environmental organizations, MOE does not currently have a formal emerging issues process that is part of a formal Knowledge Management strategy or that is integrated into the organization's strategic planning, policy development, operational planning, and outreach activities. Having said this, Ministry officials certainly recognize the value of and need for this kind of process in terms of improved internal understanding and decision-making. They also clearly understand the opportunity it presents for broadening stakeholder and public participation in environmental management and the improved partnerships and increased awareness and understanding of issues that results.

In the past, the Ministry has undertaken a number of future thinking exercises, using a variety of methodologies and approaches, including many of the elements of the framework presented earlier in this section. Our review indicates that in these exercises, Ministry officials have undertaken systematic assessments of environmental issues, developed comprehensive issue profiles and identified management actions required.

Generally, however, these have been ***one-off*** exercises, in that they have not been an institutionalized component of the strategic business planning process for and ongoing management of the Ministry. Furthermore, expectations for how the results of the process would be used to inform ongoing decision-making across all parts of the Ministry, let alone other ministries, were not set. As well, these one-off processes were usually internal government exercises with limited opportunities for outreach and open external participation in the process, although staff did draw more informally on their own, often extensive, networks to identify issues warranting attention. Finally, the exercises were not viewed or used as opportunities to build broader external understanding of issues and consensus or to achieve enhanced public education and support for Ministry directions.

More recently, within these limitations, the Ministry has made a number of important and valuable efforts to strengthen its capacity in this area and adopt a more formalized approach. These efforts include a number of recent scenario planning and issues-identification exercises and the commissioning of a major external study in this area concluded in January 2000, including an appropriate conceptual framework and very detailed recommendations for the design and ministry-wide implementation of a formal emerging issues process.

At this stage, the Ministry and the Government have not made a decision with respect to moving forward with the approach recommended by the external consultants. Factors that have affected this absence of clear direction to proceed appear to include a lack of management and staff time and resources to undertake this kind of regular and substantive knowledge-building exercise, possible concerns about whether the products of this kind of exercise will actually be utilized to enhance the quality of decision-making, and the absence of a clear mandate/direction with respect to the value of broader consensus building exercises.

8.0 Environmental Monitoring and Reporting

1. Introduction

The availability and accessibility of comprehensive environmental information is a cornerstone of effective environmental management and an integral part of an environmental Knowledge Management strategy. A well-developed environmental information system helps to identify emerging issues and to frame informed discourse on these issues. It is also essential to help identify options for action and to evaluate performance.

Our review of best practices in environmental monitoring and reporting is based on two commissioned studies. The objective of one of these studies (*Research Paper #8 Environmental Monitoring: Leading Jurisdictions, Beak International*) was to identify examples of best practice jurisdictions, the reasons these jurisdictions were classified as such, and examples of innovative, working approaches to environmental monitoring. A project team of experts on monitoring identified leading jurisdictions in Canada, United States and Europe through an Internet search, and then followed up with personal contacts to elicit more detailed information. More precise information was solicited through a comprehensive questionnaire that was developed for the targeted agencies; and, this was followed up by in-depth telephone interviews.

The goal of the second research study (*Research Paper #9 Review and Analysis of Best Practices in Public Reporting on Environmental Performance, Michael Keating*) was to provide advice on best practices in public reporting on environmental performance based on a scan of current practices using interviews, a review of reports and Internet research. It is not a study of all environment and sustainability reporting systems, but a focused look at the state of the art with reference to some jurisdictions identified by experts in the field.

2. Overall Conclusions

There is a trend towards monitoring and reporting systems that integrate broad environmental data to support decision-making.

- While technology remains at the heart of environmental monitoring, the emphasis has moved from increasingly sensitive analytical equipment to information systems that integrate, correlate and manage data produced by monitoring equipment.
- Environmental reporting is also being broadened to show the interconnections among environmental, economic and social issues.
- Governments and companies are beginning to use broader environmental reports to help improve performance and show how they are delivering on promises.

What is being monitored is changing to better define ecosystem health and the effectiveness of environmental management systems.

- Environmental indicators offer a more meaningful way of tracking progress and integrating information. Indicators address broad desired outcomes such as water that is safe to drink and fit for swimming.
- Biomonitors (censuses of fish and aquatic invertebrates) are being used by more jurisdictions as early warning indictors of watershed stress.

Monitoring and reporting systems are being designed and managed in partnership with the private sector, the public and other jurisdictions.

- New technologies are enabling a move away from top-down reporting where experts tell people what they think they should know. Information portals in leading jurisdictions allow people to query the system with their own questions, even going to environmental maps of their neighborhoods. This approach reflects the view that a better informed public can participate more meaningfully.

- Monitoring programs are being designed with public and private stakeholder consultation on a watershed basis. This allows the information to be used for land-use planning, community development, industrial and municipal discharge permits, etc.
- Information is being integrated and shared across jurisdictional boundaries. This is a critical development to sustain cooperative action on trans-boundary pollution issues.

3.0 Major Findings

3.1 Introduction

Based on our review of the research on environmental monitoring and reporting, this section on major findings is organized by the following topic areas:

- How environmental data is collected and stored.
- The type of environmental data being collected and transformed into information.
- How the environmental information is presented and communicated.

3.2 Environmental Monitoring and Database Management

Environmental monitoring did not occur in a scientifically reliable fashion until the 1960s. Even then, the ability to detect the presence of contaminants in water, air or soil was very limited. Measurements at a magnitude of only parts per thousand were possible for a small number of parameters. From the mid-1960s to the 1980s, the advances in monitoring and analytical technology were unprecedented. Today's monitoring and analytical equipment can detect hundreds of very specific chemical contaminants to one part per quadrillion.

There are three basic types of environmental monitoring programs: ambient (surrounding air or water), point source (effluent discharges and emissions), and point-of-impingement (at a particular location downwind or downstream from a pollution source).

Data is typically collected through networks of monitoring stations or sampling locations. In many cases, the recorded data has to be analyzed in a laboratory. Three basic types of parameters are typically measured: chemical (nutrients, metals, organics, etc.); physical (temperature, flow, colour, etc.); and biological (abundance and diversity of aquatic plant and animal life; bioassays). Biological monitoring is now being increasingly used in jurisdictions outside of Canada, particularly for receiving waters near point source discharges. However, it does not replace chemical and physical monitoring. All three types of monitoring programs complement each other.

Since the early 1980s, the focus of environmental monitoring has begun to shift from the development of increasingly sensitive, accurate methods for determining the levels of contaminants in the environment, towards information systems that integrate, correlate and otherwise manage the data produced by the monitoring equipment. Thus, while technology remains at the heart of best practice environmental monitoring, the emphasis has moved from analytical equipment to environmental data management systems.

US EPA's STORET (for STOrage and RETrieval) system is one of the largest systems for storing and maintaining computerized data on ambient water quality from state, federal and local agencies and from universities and volunteer monitors. US EPA is currently modernizing STORET to make it more compatible with new tools such as geographic information systems (GIS), a system for linking environmental monitoring data to geographically-coded areas such as watersheds, contaminated sites, and communities. A GIS-based database has been introduced in Austria, considered to be a leading European jurisdiction, along with Sweden, in environmental monitoring.

At the same time, however, the research found that many jurisdictions have reduced their commitment to comprehensive and reliable environmental data collection and management. Even in some leading jurisdictions, the commissioned research found differences in how senior management and frontline staff perceived the effectiveness of environmental monitoring programs. The integration of air, water, and soil monitoring data appears to take place more as a result of staff interactions, rather than as part of a deliberate program or planning objective.

The International Joint Commission (IJC), in its 10th Biennial Report (July 2000) noted that the availability and management of information and data is still a fundamental obstacle to sound environmental decision-making in the Great Lakes Basin, and a serious impediment to the implementation of the Canada-US Great Lakes Water Quality Agreement. Jurisdictions on both sides of the border have been under-investing in monitoring, according to the IJC. The Biennial Report noted that:

> *The Commission is greatly concerned that the parties cannot fulfil their goals under the Agreement because they currently lack, and will lack for the foreseeable future, the full breadth and depth of programs to obtain the environmental monitoring information necessary to guide Agreement-related programs.*

The report continued, "Air quality monitoring may be the exception and the only activity that has received increased funding. Total funding for monitoring and surveillance is, however, declining steadily and some researchers and managers are concerned that current programs will not be adequate to provide the information needed for regulatory and other programs."

The IJC also expressed concern over the incompatibility of monitoring protocols used by the different jurisdictions and its impact on decision-making.

3.3 Environmental Data Applications

Today's information technology continues to grow at an incredible pace. It is estimated that the amount of environmental data doubles every 16 to 18 months, and the capacity to store data doubles every 24 months.

The quantity of data collected, however, is not a reliable criterion for a best practice in a leading jurisdiction. Much data is easy to produce but can become stored in *data graveyards*, especially if it has been generated with no clear goal or rationale for use. While many jurisdictions are data-rich, but information-poor, some have been identified by the research as leaders in applying monitoring information to practical uses, and thus enabling better public access to environmental monitoring data.

The research found that the type of environmental data collected in leading jurisdictions through monitoring and other means (inspections, basic research) is becoming more complex, yet also more user-friendly. The data collected is then transformed into useful information, typically, for three basic types of applications:

- Measuring environmental stress (impacts on watersheds, aquifers, habitats, plants and animals, etc.)
- Measuring environmental performance (compliance data, measuring against targets and goals for emissions, releases and impacts at the jurisdictional and facility levels, etc.)
- Establishing and reviewing contaminant standards and environmental policies (feedback into the standard-setting and development process).

The main drivers of demand for environmental information vary. In most US jurisdictions, the demand is for baseline and trend information for compliance and environmental planning purposes, especially in watershed management areas (Ohio, New Jersey, Pennsylvania, Washington). US EPA mandates the collection of environmental data at state and company levels through funding and approvals programs. Florida's environmental agency, with its mission of "more protection, less process," has a very strong focus on accountability in its environmental reporting. Its goal is to "detect and address important environmental problems while providing an account of the agency's record to Florida's taxpayers". Public communications is a major driver for environmental information in British Columbia, while the needs of public policy development take precedence in Manitoba and the United Kingdom.

Over the past 15 years, an extensive amount of research has been done in many Canadian and international jurisdictions into ways of simplifying the complex volume of environmental information into more relevant indicators or snapshots of key issues and trends. Environmental indicators are a way of aggregating complex information to make it more understandable; and, to address desired outcomes such as water that is safe to drink and fit to swim in. "Indicators offer a means of tracking progress and provide integration of data and information," states the IJC's 10th Biennial Report (July 2000). "However, indicators will only be as good as the data used to develop them."

An example of a simple indicator of water quality is the use of pH to show the presence of acidic contaminants. The effects of a contaminant in a watercourse also could be indicated by counting the presence/absence of aquatic organisms sensitive to the contaminant.

Biomonitors (usually censuses of fish and aquatic invertebrates) are being used by more jurisdictions as early warning indicators of watershed stress. Aquatic organisms act as natural monitors. When combined with more traditional tools they can also help to establish cause and effect relationships. Biomonitoring measures the change in populations of test organisms and the aquatic community structure as a result of exposure to concentrations of contaminants in water. Since aquatic organisms respond to their total environment, they provide a better assessment of environmental damage than do the handful of chemical or physical parameters.

There are a number of examples of indicator systems or frameworks, including those developed by Environment Canada. US EPA has developed an extensive system of environmental indicators, especially for watershed management. The United Kingdom has a set of 15 "headline" indicators.

The European Union has 2,300 experts working to boil down 60 indicators into a "Sustainable Development Index" with only ten themes. The goal is to enable people to "assess whether overall, we are on an environmentally sustainable track."

Another ambitious project called TEPI (Towards Environmental Pressure Indicators for the EU) seeks to calculate six priority pressure indicators in each environmental policy field, for all 15 EU Member States, and show the links between the pressures and the economic sectors.

The IJC has recommended that the US and Canadian governments, as parties to the Great Lakes Water Quality Agreement, should develop indicators for three desired outcomes of drinkability, swimability and fish edibility. It has recommended further development of indicators on the elimination of persistent toxic substances and three specific indicators for the desired outcome of physical environment integrity.

In the next section, we will place the development of environmental indicators within the context of trends in environmental reporting.

3.4 Environmental reporting and public accessibility

Over the past 20 or more years, systematic environmental reporting has been developed by countries, provinces, states, cities, non-government organizations and corporations. Such information has been collected into what are often called State of Environment (SOE) reports, which cover a range of environmental issues. Most SOE reporting systems use a ***pressure-state-impact-response*** framework of indicators to show how pressures, such as consumption of natural resources and releases of pollutants, change the state of the environment and have impacts on ecosystems and humans; leading to responses, such as policy changes or shifts in consumption patterns that attempt to reduce the pressures and mitigate impacts.

Most of the early examples of SOE reporting were large compendia of environmental information. Users had to wade through hundreds of pages of facts and figures, trying to decide what were priority issues for them. One of the new trends is to try to tailor reports for different users, particularly the public and decision-makers. This has led to *dashboard* approaches of leading indicators, and to the development of aggregated, public awareness-type indices such as the *ecological footprint*. (Toronto's ecological footprint, for example, suggests that the average Torontonian needs 7.6 hectares of land and resources per year, an area roughly equivalent to five city blocks or nearly four times greater than what is considered to be sustainable, to support their activities.)

The Internet has also made it easier to make information available on demand. Internet portals in leading jurisdictions allow people to query the system with their questions, even going to environmental maps of their neighborhoods.

The early SOE reports also tended to be collections of information that scientists thought were important. In the past decade, SOE report managers in leading jurisdictions have been moving from a top-down approach to one in which audiences and experts from other sectors are consulted during the design and preparation of reports. One of the major evolutions in the process of environmental reporting has been the widening of the list of people who advise on environmental reports.

Another recent development has been the integration of environmental, economic and social impact reporting into *sustainability reports*. These reports seek to show if the activities are sustainable from the different perspectives over the long term.

In its 1998 *Sustainability Act*, Manitoba went so far as to drop the term *SOE reporting*, and replace it with the term *sustainability reporting*. In the United Kingdom there is both a SOE report produced by the UK Environment Agency, which focuses on environmental issues, and a sustainability report, *Quality of Life Counts*, from the UK Department of the Environment, Transport and the Regions. The second report deals with a much broader suite of indicators, including environmental issues and socio-economic issues, such as GDP, employment levels, health, the state of housing stock, traffic levels and crime. In 2000, the Canadian government asked the National

Round Table on the Environment and the Economy to work with Statistics Canada and Environment Canada to develop indicators that track sustainable development trends.

Florida goes one step further by linking the indicators in a series of four tiers, starting with indicators of environmental and public health, environmental behavior and compliance, through to performance and resource efficiency indicators for the state environmental agency.

Not only governments but also major corporations are working from the more sectoral environmental reports (usually covering environment, health and safety performance) to integrated or sustainability reports. The Dow Jones economic reporting system recently added a Sustainability Index that it uses to rank companies for investment purposes. According to the Index:

> *"Sustainability companies not only manage the standard economic factors affecting their businesses but the environmental and social factors as well. There is mounting evidence that their financial performance is superior to that of companies that do not adequately, correctly and optimally manage these important factors."*

3.5 Summary of Findings

In summary, the key findings from the research on best practices in environmental monitoring and reporting are as follows:

(1) Monitoring programs are being designed with public and private stakeholder consultation and managed on a watershed and airshed basis. This allows the information to be used for land use planning, community development, industrial and municipal discharge permitting and other watershed related purposes.

(2) Monitoring information is being made available to decision makers and the public on a real time basis through Internet access. This information is being tailored by leading jurisdictions to meet user needs by linking it to

geographic information system (GIS) coordinates (water and land information) within a watershed or airshed context.

(3) Point source monitoring responsibilities are shifting to industry and municipalities in leading jurisdictions. Accuracy and reliability are being ensured by third party audits and by making company officers legally accountable. As data is produced it is being made available to the public through the Internet. Government agencies are retaining responsibility for ambient, non-point source and receiving body monitoring. Many leading jurisdictions are developing partnerships to support this responsibility.

(4) Biomonitoring is becoming a stronger part of integrated monitoring programs, particularly for receiving waters near point source discharges. Some leading jurisdictions have expanded traditional biomonitoring to include more trophic levels as well as DNA testing. Programs such as Environmental Effects Monitoring (EEM) and Great Lakes Sediment Assessment are examples of current Canadian federal programs being undertaken. In contrast to other countries, however, in Ontario the use of biomonitoring does not appear to be increasing.

(5) Because environmental issues cross jurisdiction boundaries, monitoring programs and databases are being integrated and managed cooperatively between jurisdictions.

(6) Environmental reporting is being built into decision-making systems. Governments and companies are using environmental reporting systems to help improve performance and show how they are delivering on promises. Environmental objectives are being incorporated into business plans by both government and industry.

(7) Environmental reports are being broadened to show the interconnections among environmental, economic and social issues. This is called integrated environmental reporting or sustainability reporting.

(8) New technologies, particularly geographic information systems (GIS) and the Internet, are enabling a move away from top-down reports in which experts tell people what they think people should know.

4. The Ontario Context

MOE has had a long history of being a leader in environmental monitoring and was at the forefront of many of the analytical advances over the last forty years. It has continued to retain experienced staff with considerable chemical and biological monitoring expertise.

MOE has a large number of databases and monitoring programs that collect and contain a broad range of data on the ecosystem health for most parts of the province. Integration of these databases is only just beginning. Without this integration, MOE will not be in a position to respond to the *strategic shifts* including effectively reporting on the environment or progress in achieving environmental outcomes.

Based on interviews with key individuals (inside and outside MOE) and supporting information from the IJC, the Ministry has not been investing adequately in its monitoring program for the Great Lakes and associated watercourses.

In addition, MOE has not kept pace with the leading US states in developing some of the new biomonitoring and environmental indicator approaches.

MOE has not invested sufficiently in information portals to provide the private sector and the public with information on environmental quality compared to leading jurisdictions. Information is difficult to obtain and understand through MOE's present website.

9.0 Access to Scientific & Technical Expertise

1. Introduction

As identified throughout our review, knowledge and information are critical to effective environmental management. To varying degrees, a strategic approach to Knowledge Management – the ability to acquire, create, add-value to, broadly share, and use information – is a characteristic of leading environment departments. The specific component of accessing scientific and technical knowledge and expertise is especially important, given the universal requirement for strong science to support decision-making.

For the purposes of our analysis of this area, we defined scientific and technical expertise as that expertise which is required to:

- Identify and assess risks (in particular, but not limited to, environmental risks).
- Determine the technical need to manage or eliminate such risks.
- Identify and evaluate methods for elimination/mitigation.
- Support the implementation of those mitigating methods.

In addition to our discussions with officials from other jurisdictions and our own research and review of the literature, the ideas and information in this section draw on external research on how environmental organizations access scientific and technical expertise. *(See Research Paper #7: Access to Scientific and Technical Expertise, Dillon Consulting Limited.)*

The purpose of this section is to provide the following:

- Overall conclusions with respect to the best practices for accessing scientific and technical expertise in leading environmental organizations.

- Specific examples of practices in other jurisdictions drawn from the research.
- An overall assessment of the current MOE context with respect to accessing scientific and technical expertise.

2. Overall Conclusions

Our research and analysis supports the following conclusions with respect to the best practices employed by leading environmental jurisdictions in accessing scientific and technical expertise:

- Most public sector organizations in Canada and around the world have been challenged in the past decade or more by budgetary constraints leading to the downsizing or elimination of both in-house and external research and development capacity.
- Notwithstanding this more general trend, leading environmental jurisdictions continue to engage in or substantially support research and development activities employing a range of approaches to identifying the issues to be researched and the acquisition of scientific and technical expertise.
- These jurisdictions rely, to varying degrees, on relationships with professional research organizations and academia to enhance their own knowledge and that of stakeholders, including the regulated community, NGOs, and the public.
- Leading jurisdictions recognize the value of external stakeholder partnerships in terms of the scientific and technical expertise that these organizations can bring to bear, including the regulated community and NGOs.
- There is a strong element of external transparency in the activities of leading jurisdictions. This includes making research programs and products easily accessible, as well as relying on external oversight mechanisms, e.g. external review committees and peer review

processes, and, in some cases, multistakeholder program designed to ensure quality and relevance.

- For most jurisdictions, the primary emphasis is on scientific and technical expertise to address specific problems, usually in support of a specific regulatory action or program activity. However, there is often a strong, and in light of the *strategic shifts* we have identified in our report, important secondary emphasis on broader areas of research, including longer term environmental (e.g. physical, chemical, biological, geological), sociological, and economic issues that have implications for environmental management in the future.

3. Major Findings

This discussion of major findings is presented in two parts:

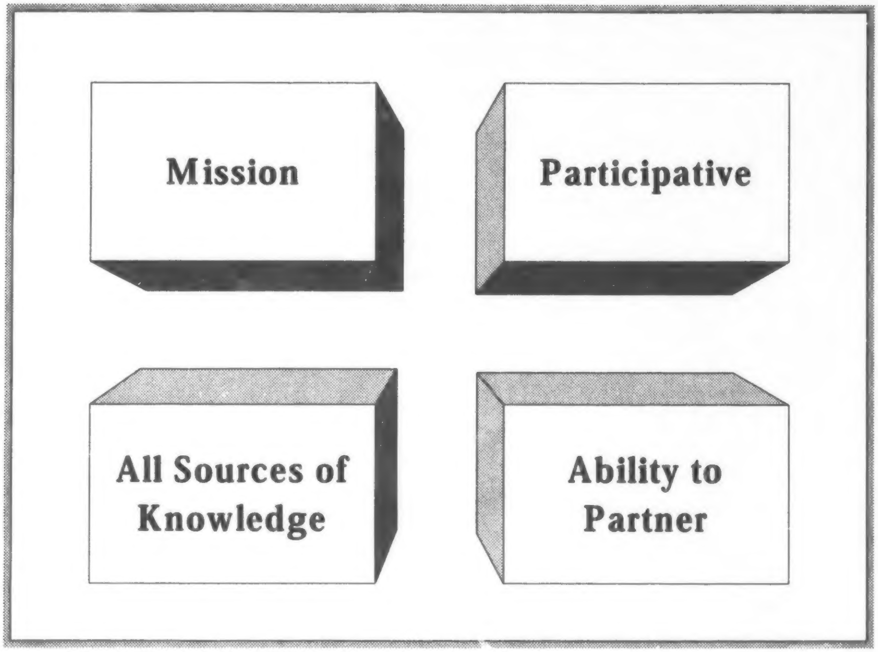
- A summary of the defining characteristics of leading jurisdictions with respect to accessing scientific and technical expertise.
- A discussion of current trends identified through our research and discussions with organizations and individuals, including highlights of specific examples of best practices in other jurisdictions.

3.1 Defining Characteristics

Research Paper #7 presents a useful four-part framework for describing the defining characteristics of a leading environmental jurisdiction, with respect to its ability to effectively access scientific and technical expertise:

- Understanding of the Mission.
- Participation.
- Valuing all sources of knowledge and continuous learning.
- Ability to partner.

Each of these is summarized below (*see diagram on next page*):



Understanding the Mission

- The key outcome of a clear mission statement is that it focuses organizational resources on key priorities that will be addressed and provides clarity with respect to what is not a priority or will not be undertaken. Each of the organizations examined demonstrated an understanding of their mission, in particular as it related to accessing scientific and technical expertise. For some organizations, e.g. the Netherlands and New Zealand, this means a focus on stakeholder driven policy development and program implementation. For other organizations, such as Health Canada, this means a commitment to being leaders in research and development in their spheres of interest.

Participative

- Most of the organizations examined clearly recognize the need for, and the value of, external stakeholder participation and input. These organizations have or are moving beyond the *"This is our policy/proposition, what do you think of it?"* mode of operation to more participative approaches in which the stakeholders are involved in the decision-making and oversight processes. This approach also recognizes that *"We don't have to know all of the answers, as long as we know where to find them"*. The organizations that are most participative are those that have moved the furthest from the *us versus them* concept of getting things done.

Value all Sources of Knowledge and Continuous Learning

- Leading organizations clearly recognize that business/industry, NGOs, and academia all make valid and important contributions to the knowledge pool in support of continuous learning. Furthermore, there is recognition that these organizations represent opportunities for exchange, renewal and growth of the talent pools. A number of leading organizations fund broad as well as specific academic programs in recognition of the importance of academia as a principal source of new skilled resources for their own organizations.

- The leading jurisdictions have also recognized the importance of investing in people in terms of training and developing expertise. Common methods focus on training and development through:
    - External sources such as seminars, workshops, courses and conferences, and membership in professional organizations and technological associations.
    - Internal on-the-job training, seminars, mentoring, use of an Intranet and/or Internet and providing an opportunity and financial compensation to enroll in post-secondary or other related courses.
    - Reciprocal secondments in and out of government in partnership with the regulated community and NGOs.

Ability to Partner

- Leading jurisdictions demonstrate the ability to create partnerships with other agencies, NGOs, and industry. This ability reflects their understanding of the value of *managing* resources versus *owning* them. It is supported by a clear understanding of the core skills that will be maintained internally and those that will be developed externally (typically based by the direction set out in the organization's mission statement).

- Having said this, most organizations feel that in the operations areas, the issues are often more immediate in nature. This translates into a belief that these issues cannot be resolved on a timely basis through external processes, and do not lend themselves to drawn out decision-making processes. The conclusion, therefore, is that these issues require in house resources, in some cases combined with short-term contracts involving external experts, laboratories, and other governments.

3.2 Current Trends

Through our research and discussions with individuals and organizations, we identified a number of trends in recent years that have affected whether and how organizations decide to access scientific and technical expertise.

Downsizing In-house R&D/Outsourcing

Our research identified two environmental organizations that maintain significant internal research and development capabilities: US EPA and the Air Resources Board of the California EPA.

The US EPA maintains a large central research and development organization with an operating budget of US$560 million per year and approximately 1800 employees. About 64 percent of the operating budget is consumed internally, with the remainder being distributed almost evenly to consulting contracts and academic institutions. Most, if not all US States largely rely on US EPA for their environmental research and development needs. The State agencies devote their resources to development and implementation of environmental protection programs.

Cal/EPA's Air Resources Board takes a similar approach to US EPA, allocating 20 percent of its overall budget to fundamental research, with 50 percent of that figure allocated to external sources. There is also evidence, compared to US EPA, of greater interaction with industry in determining their research and development agenda. However, this board is an anomaly within the Cal/EPA organization.

The reasons why organizations do not maintain significant internal research and development capabilities are diverse and include:

- Budgetary pressure.
- Perception of a lack of accountability in in-house research and development organizations.
- Belief that outside organizations are more innovative or attuned to emerging issues.
- Belief that a central organization can deliver research and development more cost effectively.

While, as indicated above, most organizations have responded to financial pressures by largely eliminating any in-house research and development capacity, the Swedish EPA is an example of an environmental organization that has maintained substantial research and development activity but completely outsourced it. The agency has a small Research Secretariat with a budget of only US$1 million and a staff of 50. This Secretariat is responsible for administering over $US30 million of its own money. In addition to this amount, the Secretariat has obtained for 2001, US$200 million in environmental research funding from the European Union in recognition of Sweden's excellence in this area. This funding flows to external bodies, predominantly academic institutions. The Secretariat uses a series of oversight committees consisting of representatives of business, academia, and government.

The approach of the Australian Land and Water Resources Research and Development Corporation, an agency of the federal Government of Australia, is similar to that of Sweden. Almost 80 percent of the Corporation's total budget of AUS$24 million is made available to outside organizations, focused on "the sustainable use, productivity and conservation of Australia's land, water and vegetation resources". This funding is matched by AUS$39 million in partnership funding from private industry, academia, and other research organizations.

The UK Environment Agency maintains a significant research and development program, also focused almost exclusively on funding of other government and external organizations. Total funding for the past year was £10.6 million. Since 1998, the program has been given overall direction through the Agency's official Research and Development Strategy (*see Appendix H*). This document is a good example of a well-developed, institutionalized approach to research and development. In particular, it provides an excellent example of how an environmental organization's agenda to access scientific and technical expertise should specifically reflect the knowledge and information required to achieve the overall vision and strategic plan – what the UK Agency calls a "business-driven approach". The "business" in this case is identified as both "proactive and long-term perspectives" related to the Agency's longer-term Environmental Strategy, but also "immediate issues… that will enable us to develop an efficient and effective operational structure."

Health Canada has developed an extensive external program for developing and accessing scientific and technical expertise through its recently established network of Canadian Institutes of Health Research. This body is chaired by a Governing Council and consists of 13 separate institutes covering specific health related areas. It provides $400 million in funding this year, rising to $550 million over the next two years, to external research teams from a variety of voluntary, private and public sectors, including universities, health and research centres, teaching hospitals, and federal and provincial governments. The teams are reported to include a range of disciplines, including biomedical research and both the natural and social sciences.

The Pulp and Paper Research Institute of Canada is an interesting hybrid approach. The organization itself represents an outsourcing of research and development activity by the member companies. However, the Institute is primarily an in-house research organization, with about 10 percent of its budget directed at external funding of primarily academic organizations.

The Great Lakes Fishery Commission's research and development program is relatively small and has historically been largely internal. This presents a different form of challenge given the difficulty the organization has in attracting and maintaining staff, as well as achieving a scientific/technical critical mass. In response to this challenge, the Commission is developing external partnerships, in particular with the University of Michigan.

Most of the organizations contacted devote some portion, i.e. 10 percent or more, of their research and development dollars to funding external research and development, particularly fundamental research and development undertaken by academic institutions.

Use of Multistakeholder Advisory or Oversight Groups

Several of the organizations contacted are employing a variety of multistakeholder groups to assist them in identifying the issues or research and development on which they ought to focus, and to help identify the most appropriate resources to bring to bear on those issues. Often the more fundamental the research is, the more likely it is to be directed toward an external academic institution.

In the areas of research and development and program support, several organizations have a measure of formalized multistakeholder input into program design including US EPA, Swedish EPA, UK Environment Agency, Health Canada, Paprican, New York State, Michigan State, and the Great Lakes Fisheries Commission. The US EPA and California EPA utilize external committees to peer review their research and development work.

Stakeholders may include NGOs, industry, academics, other governmental agencies, etc. Sweden employs a series of boards and committees made up of staff and external experts to oversee both short and long term priorities. Various components include representatives from the broader research community, industry, local authorities, and other agencies.

Health Canada's Research Institutes have external *Institute Advisory Boards*. Each Board is led by a Chair, appointed by the Governing Council from among the board members. These Boards serve to gather expertise, for discussion of, and deliberation on Institute priorities, for guidance on implementation of Institute plans and for dissemination to and engagement of the broader community. The full list of official responsibilities are very consistent with the defining characteristics identified earlier in this section and also with the framework for a Knowledge Management strategy presented in Section 6.0 of our report. They include the following (provided by Health Canada):

- Engage stakeholders with an interest in health research to work together to build an integrated, innovative, interdisciplinary Health Research Institute responsive to Canadian health needs and research opportunities.
- Champion integration across disciplines and across the full range of biomedical research, clinical research and research respecting health systems, health services, the health of populations, societal and cultural dimensions of health and environmental influences on health.
- Work collaboratively with the Scientific Director to develop the Health Research Institute's Strategic Plan and annual activity plans and budgets for approval by the Governing Council.
- Conduct a periodic "self-assessment" and annual evaluation of the performance of the Health Research Institute in meeting the objectives of the Canadian Institutes for Health Research, and the objectives outlined in the Institute's strategic plan.
- Work collaboratively with the Scientific Director to apply an ethical framework to all Institute activities and research.

- Be a source of informed insight from the health research community and the public, introducing knowledge, expertise, creativity, insight and innovation to all Institute discussions and activities.
- Be a means by which researchers and other stakeholders have input into identifying priorities and potential programs as well as into the strategic direction of the Health Research Institute.
- Facilitate communication between the Canadian Institutes of Health Research, the Institute and the wider community of researchers, voluntary health agencies, industry, provinces and beneficiaries of health research.
- Actively foster networks, partnerships and community interests.
- Pursue linkages with other Health Research Institutes for cross-pollination of ideas and collaboration.
- Discuss prospective crosscutting opportunities.

Involving Multistakeholder Groups in Policy Development

Health Canada, the UK Environment Agency, Alberta, the Netherlands and New Zealand are all engaged in efforts to increase the level of participation of non-governmental organizations, business, the public, and non-environmental government agencies in the policy making phase of environmental protection. For example:

- In the absence of a significant research and development capacity in British Columbia, the Department of the Environment's Pollution Prevention and Remediation Branch has acknowledged that obtaining external knowledge is an integral part of its ability to maintain up-to-date technologies and standards. The Department now relies more on expertise within industry for issue identification and pollution prevention planning.
- The Netherlands successfully engages industry and NGOs in the development of sector wide criteria and the establishment of sector covenants.

- Alberta has put in place a process through its Clean Air Strategic Alliance (CASA) which stands out as an example of involving a consensus seeking multistakeholder body (which includes the Alberta government) in strategic air quality planning, priority-setting, resource allocation and plan development.

Moving towards this broader public participation appears to require greater access to and greater reliance on the scientific and technical knowledge of external partner organizations. This is in contrast to a more general trend of government consultation focusing on how a specific policy direction should be implemented.

Increased Reliance on Partnering

There is a clear trend toward increased partnering with third parties. Generally, this falls into one or more of three alternate approaches:

- Engagement of the stakeholders.
- Medium to long-term relationships with academic institutions.
- Short term, project specific relationships with consultants.

A key outcome of the involvement of third parties is their engagement in the process (whether environmental protection, industrial research, or any other activity) and their "buy-in" to the outcomes. These in turn contribute to greater efficiency and perceptions of success/value. Other major outcomes include:

- Cost effectiveness compared to building and maintaining in-house capacity in all areas.
- The infusion of knowledge that results from the much broader constituency now involved.
- Tapping into outside organizations as a major source of new knowledge, creative thinking, and a major source of new expertise.

The Swedish EPA and related Swedish environmental agencies appear to be among the leaders in this area. Our research indicates that they have become so effective at managing third party resources that they now receive a disproportionately large amount of environmental research and development funding from the European Union. Approximately 10 percent of the Swedish Research Institute's budget is matched by funding from private industry. Australia's Land and Water Resource R&D Corporation has also been very successful in implementing a partnership approach, with partner financial contributions to research and development exceeding the Corporation's own funding by almost 60 percent.

Health Canada's Institutes for Health Research involve broad multistakeholder participation in a range of activities, including priority setting, planning, conducting research, and peer review including health advocacy groups, external health policy organizations, foundations and private funding bodies, private industry, health professional associations, and academia.

The UK Environmental Agency, through its formal Research & Development strategy, has identified partnerships both internal and external to government, including other government departments and agencies, various national research councils, universities and other academic bodies, industry groups, private research organizations and foundations, European Union organizations, and US EPA (identified as a world leader).

British Columbia has recently announced its intention to develop a strong partnership approach that draws more heavily on the expertise available through industry and NGOs. The Great Lakes Fishery Commission's growing relationship with the University of Michigan is yet another example.

Alberta Environment and the California EPA have interesting variations on the theme of partnering in research and development.

- The Alberta Research Council, formerly a part of the Ministry of Innovation and Science and now a separate publicly funded provincial corporation, emphasizes research and development to strengthen economic development and innovation in the areas of environment, agriculture, forestry, health, and manufacturing. In partnership with various industry sectors, the Council's focus is on new technologies and products through funding of projects and the work undertaken directly in its 13 technical research facilities. The Council's performance is measured in terms of new products, sales, and jobs created.

- The California EPA has its California Environmental Technology Partnership (CETP) program, which brings together agency officials with industry and NGOs, as well as the academic, financial and legal communities. The purpose of the program is to promote technical innovation, expedite regulatory acceptance and approval of new technologies, and to promote the export of California-based environmental technologies.

In terms of partnerships at a more operational level, the examples are fewer and, as would be expected, narrower. For example, the New York Department of Environmental Conservation contracts with analytical laboratory services, and has arrangements with local health offices to provide *first responder* services in the event of a local emergency. The New York State Environmental Facilities Corporation out-sources technical approvals of wastewater treatment systems as part of its agreement to provide funding. The New Zealand Ministry of the Environment contracts out all research and development, laboratory work, and other scientific and technical skills required to the private sector or to other agencies. The New Zealand Ministry reports a significant increase in credibility as a result of this access to more global expertise.

4. The Ontario Context

Over the past decade or more, the Ontario Government, including the Ministry of the Environment, has experienced fiscal pressures and changing priorities that have led to the significant downsizing and/or elimination of the research and development function and relationships with external research organizations in many ministries. Before this development, the Ministry had a separately identified research budget and drew on the advice of an internal research advisory committee. The primary emphasis was on in-house development with the Ministry being recognized internationally for its leadership in a number of areas.

Under the Ministry's current vision, science has an important and appropriate role to play as advisor/informer, but it is not necessarily the sole determinant. The Ministry has continued to maintain a core of scientific advisory and technical people – notwithstanding issues related to competitive salaries and succession planning – that is primarily focused on the current program agenda.

Our review suggests that Ministry officials are aware of the need to broaden and deepen the organization's base of scientific and technical expertise both internally and externally. At present, however, the Ministry – as with many other ministries and governments –does not have in place an overall research and development strategy that:

- Is an integrated component of achieving the organization's overall vision and strategic plan and that involves clear expectations for how it will inform decision-making throughout the organization.
- Focuses on the overall knowledge and information requirements – not only scientific and technical but also other forms such as social and economic – of the organization as part of achieving its mandate or business vision.
- Establishes research as an important component not only of risk assessment, standards setting, and day-to-day operations, but also of the broader and more strategic policy development function.

- Builds external partnerships and collaboration, as well as incorporates external expertise and advice.
- Distinguishes between types of research or areas of study that would be managed in-house as opposed to through external partnerships.
- Allocates resources to agreed-upon research priorities.
- Is enabled by technology that facilitates organizing, accessing, sharing, communicating about, and using internal and external knowledge and expertise.

In the absence of such a strategy:

- The approach and expertise within the Ministry is very focused on the scientific requirements for standards development and approval and to support day-to-day operations, with much of the work focused on evaluating and amalgamating existing scientific analysis available from other jurisdictions.
- The organization does not appear to have a well-developed internal or external capacity in place to conduct broader, longer-term research and analysis.
- Knowledge and expertise exists in various *pockets* around the Ministry and is not easily made use of, e.g. identified and catalogued, benchmarked against strategic priorities, shared/accessed, or used on a consistent basis to support decision-making.
- The Ministry does not have a strong current base of experience in this area with respect to managing processes of external involvement and partnership.
- The organization does not currently have a good capacity, either internally or externally, to provide and incorporate expertise and knowledge from other disciplines that are increasingly being recognized in Canada and elsewhere for their value in environmental management, including social and economic analysis.

10. Risk Analysis

1. Introduction

Science-based risk assessment – the primary tool used to develop standards – has long been a critical component of environmental management. When we began our review, we were thinking in terms of best practices in risk assessment, specifically as it relates to the traditional standard setting process.

As we proceeded, however, it became apparent that conceptual thinkers and leading jurisdictions are developing more comprehensive approaches to meeting the complex demands of strategic environmental management. This more comprehensive approach, applied to environmental management, is called *Risk Analysis* and includes three components:

- Risk assessment.
- Risk management.
- Risk communications.

Among the various specific areas of study incorporated in our review, Risk Analysis is one of those that we would characterize as an *emerging* best practice for reasons that will be more fully described in this section of our report.

In addition to our own research and review of the literature, as well as discussions with officials in other jurisdictions, concepts in this section are based on external research on how environmental organizations approach risk *(see Research Paper #10: Managing Risk in a Complicated World, Dr. K.M. Thompson, Assistant Professor of Risk Analysis and Decision Science, Harvard Centre for Risk Analysis).*

Based on our synthesis of these materials and discussions, the purpose of this section is to provide the following:

- Overall conclusions with respect to the best practices for Risk Analysis.

- A discussion of the ways in which other jurisdictions use components of Risk Analysis.
- An overall assessment of the current MOE context in this area.

2. Overall Conclusions

Our research and analysis supports the following conclusions with respect to the best practices employed by leading environmental jurisdictions in Risk Analysis:

- Most people seem to agree that Risk Analysis is a valuable tool for environmental management but there is some debate with respect to how Risk Analysis should be used and how much influence it should have on government decisions.
- Many environmental jurisdictions have focused their activities primarily on science-based risk assessment, with little attention paid to other disciplines such as sociology, economics, law, and aspects of health sciences, or the emerging areas of risk management and risk communication.
- Traditional risk assessment is generally based on science and focused on the *one chemical/one media* model. It does not deal effectively with multichemical, multimedia, place-based approaches. Using this approach, processes for external engagement are typically *back end*, often described as *decide-announce-defend*. These processes focus primarily on challenges associated with implementing risk assessment decisions, as opposed to external involvement in the risk assessment and risk management analysis and deliberations themselves. In addition, there is limited focus on broad public participation.
- As they evolve, these more comprehensive emerging approaches have several major defining characteristics:
    - Recognition that risk assessment, risk management, and risk communication require different skills and expertise, but

    together make up one framework that should be applied consistently across an organization.

  - Attempting to move beyond the ***one-chemical/one-media*** approach to a more comprehensive and complex understanding of the cumulative impacts of a chemical or multiple chemicals and other stressors on human health and ecosystems.

  - Public engagement that is transparent, inclusive as possible, and begins early on in the process. It includes up front external participation in priority setting and in the analysis and deliberations related to the risk assessment and risk management phases. This approach contributes to the development of stakeholder and public trust, cooperation, understanding of the issues and risks, and ultimately support for the eventual outcome.

- Beyond environmental management, we did not find evidence that Risk Analysis is generally being applied more broadly and formally to the management of public sector organizations as a whole, i.e. overall strategic priority setting, stakeholder and public participation, and resource allocation.

- Consistent with the theme of Risk Analysis as an ***emerging*** best practice, we found only a few limited examples of attempts to use these tools for more than just evaluating human health and environmental/ecosystem risk. Most notably US EPA has attempted on occasion to use particular tools within Risk Analysis – for example, Comparative Risk Analysis – to analyze and compare its stated priorities against actual resource allocation within the agency. This approach was reported to have resulted in some degree of realignment of resources.

3.0 Major Findings

This discussion of major findings is presented in three parts:

- A summary of definitions.
- Guiding principles.
- A discussion of current trends.

3.1 Definitions

Risk Assessment

Risk assessment tends to be based on numbers/probabilities and scientific analysis. A Risk Assessor focuses on analyzing the available science to answer the following three questions:

- What can happen (or go wrong)?
- How likely is it?
- If it does happen, what are the consequences?

It also includes descriptive information about particular consequences, which by necessity tend towards identifying potential bad outcomes. Risk assessments are basic inputs into the risk management process.

Risk Management

Risk Management is essentially the policy decision-making process. It involves weighing risks about what often is an uncertain event that could possibly happen, against factors such as societal values, economic costs, technological and political feasibility, legal considerations, effectiveness of the actions, and fairness. A Risk Manager is someone who carefully weighs the available science against other factors such as values and policy direction, in order to make decisions – in short, seeking ways to reduce or eliminate the chances of bad outcomes occurring and to lessen the severity of the consequences if they do occur.

Risk Communication

Risk Communication deals with the issue of the difference between who is making the decision and who is affected. It is the process for increasing public knowledge of risk issues and for involving the regulated community, NGOs, and, most importantly, the public in risk management. It is a form of dialogue that involves internal and external experts, policy makers, the regulated community, NGOs, and the public, and encompasses both the risk assessment and risk management phases.

3.2 Guiding Principles

Research Paper #10 provides a number of principles that should guide the design, development, and implementation of a Risk Analysis approach.

Principle #1: Risk assessments must use good science.

Scientific evidence, for which the scientific method places some requirement on the collection of data, serves as the critical information base for all risk assessments and is required to develop models and specify inputs. The minimum criterion is that existing scientific knowledge must provide a reasonable basis for concern. This approach ensures that:

- Decisions have a basis in evidence that presumably can be reproduced and that will withstand some level of rigorous challenge.
- Hypotheses and assumptions made to deal with uncertainties can be made explicit, and can be identified as candidates for additional scientific research.
- Resources are not wasted on poorly understood issues.

Principle #2: Risk management must be fair and reasonably transparent.

Given that environmental decisions affect people differently or are perceived differently, the process by which these decisions are taken is important and can have a major impact on the ultimate effectiveness of the decision. The benefits of a more open approach include:

- Greater public accountability.
- Opportunities to create trust.
- Greater support at the end of the process for successful implementation.
- A more complex public discussion that, in the longer term, encourages deeper understanding and communication of environmental issues.
- Opportunities to leverage pressure from the public and NGOs as part of achieving continuous improvement in the regulated community.

Principle #3: Resources are limited and should be spent wisely.

Given limited resources in the public sector, Risk Analysis may be used to identify the most significant problems and to reallocate resources. Our research identifies three formal Risk Analysis tools that can assist decision-makers in making resource allocation and priority decisions: comparative risk analysis, cost benefit analysis, and cost-effectiveness analysis. As noted below, however, this practice is generally confined to the private sector. In the public sector, including environmental organizations, there are no examples of the systematic use of these tools in the broader management of an organization.

A Fourth Principle: Keeping Risk Analysis in Perspective

Based on our own research and discussions, we would add a fourth principle to the above: that of keeping Risk Analysis in perspective as a set of useful analytical, management, consensus building tools that aid in decision-making as opposed to determine decision-making.

This is an important point to make given the emerging debate – more in Europe at present than North America – about what is known as the *precautionary principle.* This approach states that where there are threats of serious or irreversible environmental damage, lack of scientific certainty should not be used as a reason for postponing preventative measures.

Proponents of the precautionary principle suggest that rational decision-making models such as Risk Analysis are not useful because they tend to be based on a level of scientific knowledge that is not possible or realistic given the large number of substances about which little or nothing is known. World leaders in environmental risk assessment, such as US EPA and California EPA, acknowledge that the current state of scientific knowledge is often incomplete, indecisive, or controversial. Furthermore, Risk Analysis is often too time consuming to deal with immediate issues and can use considerable resources that might be better utilized elsewhere. Finally, for some, distrust is a factor. In the absence of more open and participatory processes, it is not always clear that a government, in declaring that more scientific study is required, is being genuine or just delaying a difficult decision.

Critics of this approach suggest that the simplicity of the precautionary principle and the fact that the definition of a threat can be subjective or value-based, limits its usefulness for environmental decision makers that are facing complex choices, often with long-term technological, economic, and social consequences.

Our point in adding this fourth principle is to reinforce that for many jurisdictions, it is not a question of one approach or the other. In jurisdictions where leading thinking in this area is occurring, such as US EPA, the UK Environmental Agency, Risk Analysis is seen as a tool to support decision-making, not replace decision-making. Leading jurisdictions acknowledge its limitations in terms of time and resource intensity and clearly recognize the need for – if not always achieve – flexibility to make decisions based on a more precautionary approach. Finally, this debate highlights why leading jurisdictions are moving towards much more open and participatory

Risk Analysis processes as part of building consensus on what are very complex public issues.

3.3 Current Trends

From the research, our own discussions with experts, and a review of the extensive literature on Risk Analysis, we have isolated four trends that we think are relevant to the discussion of the role Risk Analysis plays in effective environmental management.

More Comprehensive Framework for Analysis	***Broader [illegible] for Setting Priorities, Aligning Resources***
More Standardized Risk Analysis Criteria	***Broader Participation, Greater Openness***

More Comprehensive Framework for Analysis

The traditional approach to environmental risk has tended to focus on those risks associated with a particular chemical in a single media (air, land, water) and, usually, at the ***point of impingement*** or after the ***mixing zone*** in watercourses, i.e. relatively near the point of emission or discharge. However, this approach is generally acknowledged as inadequate to meet the needs of newer environmental management thinking, such as place-based approaches, total cumulative impact, and the health of humans and ecosystems.

Leading jurisdiction such as US EPA and a number of states are now attempting to define risk more broadly to include four general categories: human cancer risk, human non-cancer risk, ecological risk, and general welfare/quality of life. This broader approach also includes information from other disciplines such as economics, law, and sociology. In the US, ecological risk assessment is now mandated under the *National Environmental Policy Act*. A recent review of the California EPA noted that "cross media risk assessment is critical to the protection of the environment as a whole."

Ecological risk assessment is a particularly important component of this new direction and a critical new tool that supports the *strategic shifts*. This approach emphasizes the impact of multiple stressors across media and over time, on a specific ecosystem and human health. The scope of an ecological risk assessment may be fairly narrowly defined, such as the adverse effects of development in a local wetland, a watershed that has been defined for planning purposes, or widely encompassing, such as the worldwide issues of global climate change.

To date, the primary emphasis of ecological risk assessment has been on chemical pollutants. However, jurisdictions that are adopting this more comprehensive approach are now looking at ways to incorporate other stressors such as roads, buildings, and other developments. Ecological risk assessment also requires a firm commitment to more extensive public involvement in establishing appropriate risks and priorities for their immediate surroundings.

More Standardized Risk Analysis Criteria

The evolution of international trade and a global economy has highlighted the need for more standardized approaches to Risk Analysis. In the European Union, harmonization has been increased through various agreements and

EU directives and has facilitated the free flow of economic activity. In Canada, our tendency to adopt many of US EPA's standards simplified a number of the environmental components of the North American Free Trade Agreement. The issue of harmonization as it relates to traded commodities continues, as well, to be part of the General Agreement on Trade and Tariff agenda. Experts expect pressure for further harmonization of Risk Analysis to continue.

A Broader Tool for Setting Priorities, Aligning Resources

The use of Risk Analysis in environmental management has focused primarily on assessing, managing, and communicating environmental and human health risks. The proponents of Risk Analysis point to the potential broader applicability of its tools as supports to the strategic management of enterprises. The research points to a relatively small number of examples, e.g. isolated efforts over the years within US EPA to use of Risk Analysis methodologies in determining broader strategic priorities and aligning/realigning internal resources to match those priorities.

Broader participation, Greater Openness

Broader participation and greater openness is a trend that has emerged for all three components of Risk Analysis. Traditional risk communication efforts focus on decision-making informing stakeholders (including members of the public, regulated industries, and other groups) about their decisions and providing justification. This one-directional approach, where information goes only from the decision-maker to the stakeholders, has been characterized as ***decide-announce-defend***, and it is still used in many countries where the process of risk management is one that occurs without broad participation of interested parties.

Research Paper #10 presents a useful description of the developmental stages of public participation in Risk Analysis in the US (the ***we*** in this case, is the regulatory agency):

1. All we have to do is get the numbers right.

2. All we have to do is tell them the numbers.
3. All we have to do is explain what we mean by the numbers.
4. All we have to do is show them that they have accepted similar risks in the past.
5. All we have to do is show them that it is a good deal for them.
6. All we have to do is treat them nicely.
7. All we have to do is make them partners.

The point here, of course, is a recognition of the need to move beyond the *decide-announce-defend* approach and to involve stakeholders and the public at all stages in the process – through all stages of analysis, setting priorities and developing risk management strategies, and in communicating the agreed upon approach publicly.

The leader in this area, US EPA, has been moving in part for legal reasons, to make assessment, risk management, and risk communication more iterative, transparent, and multi-disciplinary. US EPA makes particular use of external scientific advisory bodies to inform and assist with Risk Analysis activities, including formal peer review mechanisms.

The UK is an example of another jurisdiction that has acknowledged the need to do more in this direction as well. The UK Environment Agency has formally adopted the following as a value to guide Risk Analysis: *Open to others, because the Agency is not the sole expert, nor does it think that only environmental issues matter.* The UK approach stresses sharing information and tailoring consultation processes to meet the expectations of all stakeholders concerned. It recommends that decision-making processes should be documented in a clear, explicit and auditable way, both for internal and external scrutiny of the criteria, information and analysis on which the decision is based. The benefits they have been identified for this approach include:

- Giving people more confidence in decisions.
- Finding out about public preferences and tapping into a wider knowledge base about the environment so that policy-making better reflects public preferences and knowledge.
- Allowing public debate to influence the frameworks that are used to make decisions about the environment.
- Engaging in the debate about environmental issues, to enable everyone to take a more active part in the protection of the environment.

4. The Ontario Context

Overall, our assessment is that MOE is firmly positioned in the mainstream of environmental organizations with respect to Risk Analysis. By this, we mean that:

- The Ministry's primary emphasis has been on the science-based risk assessment component of Risk Analysis, as opposed to risk management or risk communication.
- As with most other jurisdictions the Ministry's primary approach is to amalgamate science and other technical information from jurisdictions that are recognized leaders in this area, i.e. US EPA, California EPA, Michigan EPA.
- The Ministry utilizes a number of risk assessment tools that are comparable to those used in other Canadian and international jurisdictions. The focus of these tools is primarily on ***one-chemical/one-media.***
- The Ministry relies on traditional consultation primarily with industry and primarily around issues of the risk associated with implementing a particular standard.

In terms of use of the more comprehensive approach to Risk Analysis identified in this section of our report, the Ministry is not currently well positioned.

- The Ministry has not integrated fulsome approaches for risk management and risk communications into its current policy framework.
- The Ministry's current approach to risk assessment – itself, a reflection of the Ministry's traditional approach to environmental regulation – does not address the challenges of multi-chemical, multimedia, and place-based approaches to Risk Analysis, i.e. ecological risk assessment.
- The Ministry's current approach to risk communication is not well developed. Stakeholder involvement is limited, as opposed to being part of a broad, all-inclusive approach to public involvement. The primary focus appears to be on communicating with industry with respect to the issues associated with implementing a particular standard, as opposed to creating broader partnerships, trust, and understanding throughout the process.
- On the issue of broader uses of Risk Analysis to support *ongoing* operations, as with most jurisdictions we surveyed, the Ministry has not explored, with the exception of the SWAT initiative, the use of these tools for activities such as broader comparative priority setting, resource allocation, and cost/benefit analysis.

11.0 Policy Development

1. Introduction

As discussed earlier in this report, the capacity to identify and address issues that cut across traditional program areas and address longer-term, strategic challenges is a key component of effective environmental management. The evidence suggests that the policy development function, supported by the knowledge gained through the emerging issues process, management and evaluation data, research, and contact with external expertise, is one of the most important tools for achieving this goal.

Our research indicates that leading jurisdictions recognize the need to build this capacity within their organizations. For the purposes of this discussion, *leading jurisdictions* includes not only examples from selected environmental departments, but also those from other types of government departments. This broader set of examples reflects our view that policy development is at its core, an enterprise-wide function within public service. As will be discussed in this section, the core components of a high quality policy development capacity should be relatively constant across departments and policy fields.

The information and views expressed in this section are based on two main sources of information:

- Our discussions with officials from Ontario and other jurisdictions, as well as research we conducted as part of this project.
- Extensive research we conducted as part of a policy-focused best practices review completed in 1999. (*See Research Paper #13: Investing in Policy: Report on Other Jurisdictions and Organizations, Executive Resource Group).*

Based on our synthesis of this material and our research and discussions, the purpose of this section is to provide the following:

- Overall conclusions with respect to the best practices in the policy development function.
- Highlights of specific examples of best practices in leading jurisdictions drawn from the research.
- Information on the *Policy Matters* initiative currently underway in the Ontario Ministry of Community and Social Services.
- An overall assessment of the current MOE context with respect to the policy function.

2. Overall Conclusions

Our research and analysis supports the following conclusions with respect to the best practices employed by leading environmental and other jurisdictions in policy development:

- At a high level, all jurisdictions are struggling with the need to redefine and strengthen their policy capacity to be more strategic, i.e. long-term, crosscutting, more knowledge based.
- This development is in response to the growing recognition that policy development in most jurisdictions, including what is often described as *strategic* policy development, most often is narrower and more prescriptive program policy and program design, including both large and small programs.
- Most environmental departments focus their policy development efforts almost exclusively on program policy development and program design. Furthermore, program policy is usually compartmentalized organizationally, conceptually, and legislatively into *silos* that reflect the traditional fragmentation of environmental programming – air, land, waste, and water.
- This narrowing of public sector expertise to focus on program policy and program design has eroded its legitimate, non-partisan role and capacity to create and disseminate the longer-term, crosscutting knowledge required to support strategic policy development.

- An additional impact of this erosion has been the significant reduction or elimination in many jurisdictions of the creation of, access to, and/or the use of knowledge inputs and tools required to develop high quality public policy such as pure and applied research, statistical analysis, and quantitative modeling.

- Many jurisdictions expend considerable effort on defining their processes for moving a policy paper through the internal decision-making system – forms, templates, purposes of committees, etc. Few jurisdictions, however, have expended comparable amounts of time or effort on setting and articulating expectations for the *content* of good public policy development, i.e. types of information, levels of analysis, stakeholder involvement, etc. In the absence of this definition, quality and content of public policy varies considerably. Furthermore, politicians and the public are often frustrated by what appears to be an inadequate or limited approach.

- Not withstanding that policy is seen in most jurisdictions as one of the most important core businesses of government, few have isolated the policy development function as a form of *discipline* within public sector management. By this, we mean dealing with the people and infrastructure required in a manner that is comparable to the professional development thinking that has occurred in other recognized functions, i.e. finance and administration, human resources, communications, information technology.

- Within organizations that have recognized the need for and have moved on strengthening the policy area, few of these have developed what we refer to in this section as a *comprehensive approach* to managing and developing this function. As a result, these organizations tend to focus their efforts on a small number of specific components, e.g. improving research capacity, renewing linkages with outside organizations, or improving recruitment strategies.

3. Major Findings

3.1 Current Challenges

Many of the jurisdictions we surveyed pointed to the same or similar challenges with respect to policy development in the public sector. Our research points to a number of developments that are occurring both internal and external to government:

Policy as a Core Business of Government

As governments around the world continue to devolve many of their operational responsibilities to other organizations (agencies, municipalities, special purpose bodies, etc.) policy development is generally seen as one of the remaining core businesses of government and as such, is starting to receive a greater degree of attention than has been the case in the past. In Ontario, this shift is clearly expressed in the Ontario Public Service Restructuring Project and its recent commitment to renewal of the public policy function. The intention, through this project, is to continue to realign service delivery where appropriate to a range of third party, private and public sector partners. At the same time, the policy development and standard-setting function is being reinforced and strengthened as one of the remaining core businesses of government.

Increasing Complexity of Policy Issues

There is widespread acknowledgement in the public sector in general, but in particular, with respect to the environment, that policy issues are becoming increasingly complex. Governments and the public are increasingly frustrated with conventional program-silo solutions that can only deal with a single component of the problem. Understanding and acceptance is growing that these complex issues – environmental management for example, but also issues such as poverty, the implications of a global economy, and homelessness – require solutions that are more broadly based, multi-faceted, multi-ministry, multi-government, and multi-informational. The various visioning and strategic direction documents of many of the environmental jurisdictions we surveyed, including Sweden, the Netherlands, US EPA, California EPA, New Jersey, made comparable references to the increasingly complex, crosscutting nature of environmental problems and, by necessity, their solutions.

Demands for a More Knowledge-based Approach

As the public and governments find that silo-based and prescriptive solutions are not meeting their crosscutting needs, they are increasingly demanding that policy analysis and the development of options be based less on experience and values, and more on knowledge and information from a wide range of sources, including other jurisdictions. Many of the jurisdictions we surveyed continue to struggle with the need to strengthen their capacity to create, access, synthesize and add value to, use, and share knowledge and information both internal and external to government. *Research Paper #5* refers to three organizations – US EPA, Cal/EPA, and the World Bank – that have acknowledged the importance of improved knowledge and information to support public policy and operational decision-making. Each of these agencies is at different stages in terms of their development.

3.2 Best Practices Frameworks for Policy Development

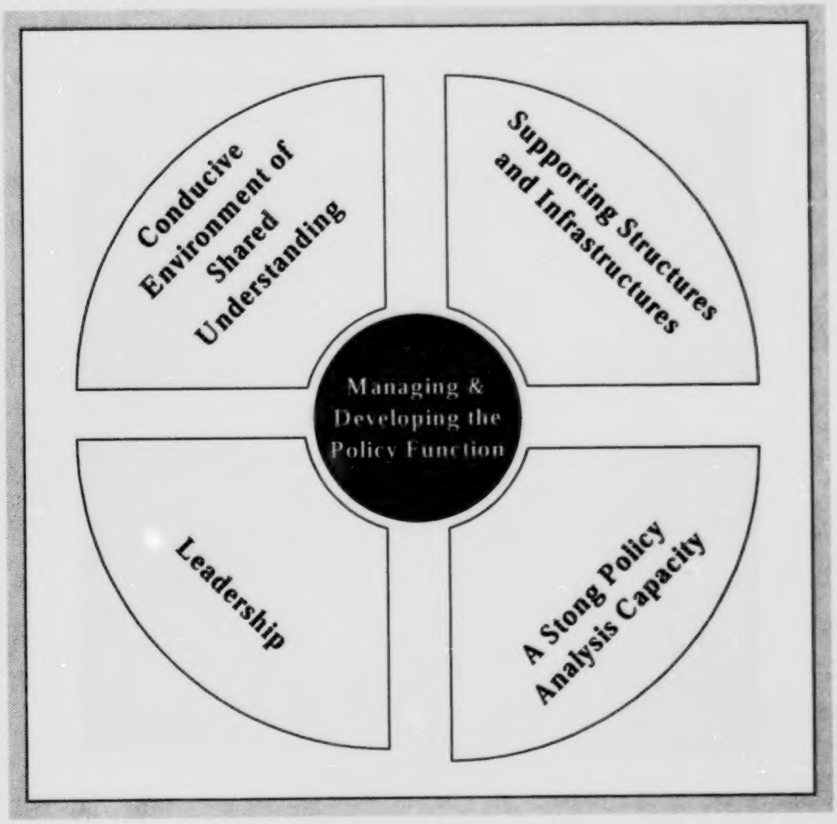
To bring coherence to this mix, we adopted and modified two frameworks for good public policy development from various existing models including, in particular, a Commonwealth Secretariat publication entitled *Better Policy Support: Improving Policy Management in the Public Service.* Our experience indicates that these are very useful frameworks in the identification and characterization of best practices from other jurisdictions. The frameworks address:

- Preconditions for developing and managing the policy function within public sector organizations.
- The elements of good public policy development.

3.2.1 Preconditions for Developing and Managing the Policy Function

Most of the frameworks we identified in our research and earlier review focused on specific aspects of policy development such as guides for dealing with the internal policy approval process, the process for identifying policy options, how to conduct research, etc.

Our experience is that these approaches, while useful, are too narrow to allow for what we would describe as a comprehensive approach to managing and developing the policy function. The following framework for a more comprehensive approach was developed as part of our earlier *Investing in Policy* work. Our research and discussions with other jurisdictions confirmed its continuing validity.


Conducive Environment of Shared Understanding
Supporting Structures and Infrastructures
Managing & Developing the Policy Function
Leadership
A Stong Policy Analysis Capacity

In effect, the four elements of this framework (*see diagram on previous page*) represent what we have referred to as ***preconditions*** for developing a strong policy function within an organization and then for producing high quality policy products.

It is important to note that no single jurisdiction – environmental or otherwise – has all of these preconditions in place. Furthermore, our view is that it is not necessary to meet all of the preconditions before significant improvements in public policy take place.

A Conducive Policy Environment

- A conducive policy environment is created when:
    - There is a shared understanding, often in the form of a strategic vision, between the bureaucracy and politicians with respect to the strategic public policy challenges and issues to be dealt with.
    - There is a common understanding of what constitutes a good public policy product.

Supportive Structures and Infrastructures

- Supportive structures and infrastructures are required for good public policy development. They include:
    - Centres of accountability for strategic policy and for the corporate health of the policy function.
    - Transparent and inclusive decision-making processes that result in timely, informed decisions.
    - Mechanisms to establish, prioritize, and scope the policy agenda.

    - Human resource strategies and tools to support the policy function, including a clear understanding of the competencies and knowledge required at all levels.
    - Mechanisms to define, identify, acquire and manage information and knowledge required for good policy development from both internal and external sources.
    - Technology infrastructure to support the above.
    - Standardized approaches including manuals, templates and tools.

Strong Policy Analysis Capacity

- A strong analytical capacity requires the development, over time, of a pool of in-house resources with solid generic and technical skills required for policy analysis and for managing the acquisition of knowledge. The strategies required to build the capacity described above include:
    - Establishing competencies, including knowledge required and analysis of existing gaps.
    - Identifying leadership requirements and analysis of existing gaps.
    - Recruitment strategies.
    - Group and individual training and development.
    - Succession planning.
    - Reward and recognition programs.

Leadership

- Leadership is the essential ingredient and key enabler required to shape culture, values and behaviours within an organization and to set and reinforce expectations at all levels. Leadership with respect to managing and developing policy capacity includes:

- Ongoing communication and example setting for staff at all levels.
- Clear expectations of policy management and of the quality of policy products.
- Consistency with the principles of Change Management as recommended in Section 12.0, including:
    - Focusing priorities to achieve a vision.
    - Demonstrating values in action.
    - Constant communication at all levels.
    - Continuous monitoring.
    - Meaningful involvement of staff.
    - Ensuring adequate resources are allocated.

3.2.2 Key Elements of Good Public Policy Development

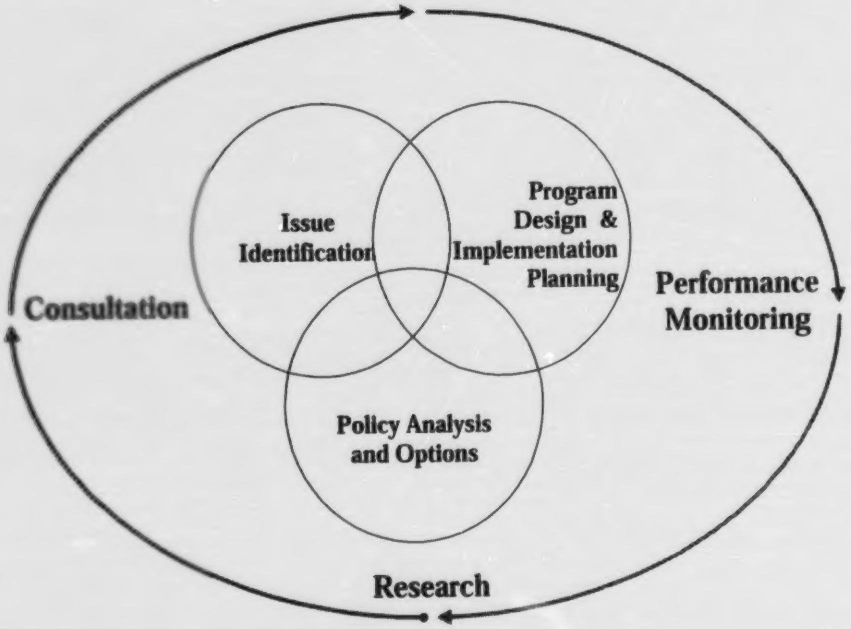
Our research for this project and our earlier work in this area, confirmed for us that having a definition in place of the elements that are expected and required for good public policy development, is a critical component of a high quality policy function.

The following is a high-level framework than can be used as a tool for the future development of the policy function within MOE, including strengthening and refining its policy capacity, and building the types of information and knowledge required. This framework was developed based on our review of policy submission guidelines from various jurisdictions, as well as a 1996 Government of Canada Task Force, led by Dr. Ivan Fellegi, which produced a report entitled *Strengthening Our Policy Capacity*. It includes six elements:

1. Issue identification.
2. Research.
3. Policy analysis and options development.

4. Communications and consultation.
5. Program design and implementation planning.
6. Monitoring and evaluation.

It is important to note that, while these are described in this section in a linear fashion, policy development should not be perceived as having a beginning or end. As per the diagram below, good public policy development is a continuous, dynamic and iterative process informed by a broad range of knowledge and information inputs:


Issue Identification
Program Design & Implementation Planning
Policy Analysis and Options
Consultation
Performance Monitoring
Research

1. Issue Identification

- Defines the issue in sufficient detail that the government understands why action is required.
- Includes the rationale and context for policy development.

- Describes how the issue is timely, relevant and meets a clearly defined need. The case for action should reflect and demonstrate coherence with government priorities and philosophy.

2. *Research*

- **Theoretical research:** Generally focused on universities. Involves conceptual models for describing broad realities. Includes: macro-economic theory, theories about the forces that shape long-term economic well being, models of environmental/economic sustainability.
- **Applied Research and Statistics:** More direct application to policy problems. Makes use of basic demographic and program data to develop indicators, describe the factors that affect outcomes, and analyze needs and utilization of services.
- ***Quantitative Modeling:*** Involves exploring the impacts and program costs of different policy options, for example, predictions on numbers served in the short and longer-term and costs attached to a program.
- ***Environmental Scanning & Trends Analysis and Forecasting:*** Includes identifying client, field and socio-economic-demographic trends, emerging issues analysis, surveying public opinion, researching delivery approaches, experiences of other programs and jurisdictions, and evaluating results. Addresses potential uncertainties, such as contingency analysis and scenario building.

3. *Policy Analysis and Options Development*

- Process of synthesizing — incorporating, making sense of, and adding new value to — information that allows for conclusions to be drawn about a current reality.
- Proactive, anticipates issues and changing needs, links with government policy and decision-making processes, and incorporates interdepartmental or inter-ministerial considerations.

- Makes creative and innovative use of best practices and research and is *evaluation-ready* through the clear articulation of realistic, measurable program outcomes.
- Based on the fundamental premise that the various approaches put forward for government consideration will be realistic and capable of being measured in terms of stated outcomes.
- Includes clear impact statements and the objective presentation of pros and cons.
- Acknowledges fiscal and other resource capabilities of the government by presenting a range of practical options that are affordable, cost effective and that balance ease of administration with accountability requirements.

4. Communications and Consultation

- Based on a solid understanding of how to involve the public in policy level discussions and which techniques are likely to be effective.
- Requires prior knowledge of and relationships with stakeholders to be consulted.
- Policy and communications staff should participate early on in the development of key messages and background materials on policy proposals and identify audiences for the plan.
- In practice, political leaders set the framework for consultation according to their overarching philosophy, management style and assessment of risks and rewards.

5. Program Design and Implementation Planning

- Process of designing and describing delivery structures required to achieve a stated policy outcome, including articulating expectations/standard setting.
- Often results in reconfigured roles, structures and incentives that affect clients and families, community partners, and other stakeholders.

- Outcome should be a workable delivery model that reflects the current knowledge of best practices.
- Includes a range of tasks: accumulating, assigning, and deploying resources, potential modifications to organizational design, and communicating expected policy outcomes, standards and other requirements to clients and the broader community.
- Issues that arise or are identified during implementation planning can result in changes to aspects of the original program design.
- Both program design and implementation planning should be interactive and call for consensus building, participation of key stakeholders, conflict resolution, compromise, contingency planning, and adaptation.

6. Monitoring and Evaluation

- Ongoing monitoring and evaluation to ensure that policies are achieving their objectives.
- Provides the basis for program and policy improvements.
- Governments rarely implement systematic approaches to determine the success of their decisions.
- Performance measures are often developed for new policies and programs but are rarely applied to longstanding government policies or programs. This is often because these older programs lacked clear goals and objectives from the outset or because the original objectives have changed over time.

3.3 Best Practices from Other Jurisdictions

As acknowledged above, all jurisdictions are struggling with the need to redefine and strengthen their policy capacity to be more strategic, i.e. long-term, crosscutting, more knowledge based. Our research suggests that, given the nature of contemporary challenges, this is particularly true with respect to environmental management.

However, we also identified many different layers of understanding of this challenge and, consequently, many different starting points. The different approaches tend to be based on the local view of the problem, the level of interest in policy development within an organization or jurisdiction, the personal interests and leadership style of the senior bureaucracy, and political direction with respect to framing and scoping broader issues.

For example, some jurisdictions have described the challenge as a knowledge and information problem, leading them to focus heavily on developing their knowledge base of research and information about strategic issues. Others have emphasized the need for new skills and abilities in the policy workforce, leading them to focus on training and development, recruitment, compensation, and rewards. Still others see it as the need to build external partnerships and have emphasized linkages with NGOs, academic organizations, think tanks, etc.

Research Paper #13 provides an overview of a wide range of best practices from selected literature and research, as well as interviews with policy officials from several Canadian provincial governments, the Government of Canada, the United Kingdom, New Zealand, the State of Oregon, and a number of other jurisdictions. This discussion of best practices is organized using the framework presented earlier in this section on page 209.

Furthermore, in Sections 6.0 through 9.0 of this report, we deal with many of the knowledge and information infrastructure supports required to develop high quality public policy, including:

- Commitment to a Knowledge Management strategy and the development of a supporting information technology infrastructure.
- Strategies to identify, scope, and respond to new and emerging issues.
- A focus on the acquisition of essential scientific, technical, and research expertise.

Given these other sections of our report, we want to use this opportunity to highlight three specific areas of our framework that we believe are particularly important in terms of environmental management in Ontario:

- Developing a climate of shared understanding between the political and public service levels of government.
- Defining the elements of good public policy.
- Creating a central strategic policy capacity.

3.3.1 Developing a Climate of Shared Understanding

Shared understanding is a critical component of our best practices framework and part of creating an environment that is conducive to good public policy development. Our research found several different approaches to developing that shared understanding between the bureaucracy and politicians, but also external to government. In many leading environmental jurisdictions this was accomplished through the development of broad government-wide visions involving strong political leadership:

- The US EPA has attempted to accomplish through its strategic planning process over a 10 to 15 year period. Over this period, the vision for the organization has been clearly articulated, refined and supported by the creation of a specific unit – the Office of Reinvention, established as a result of strong political direction to change the Agency's orientation – that was to support the ongoing refinement and implementation of the vision.
- The visioning process for the Swedish Ministry of the Environment is extremely broad and public. Led by the political level, it looks for a broader public consensus beyond just the bureaucracy and political levels of government. The vision is enshrined in legislation, which includes specific performance targets or Environmental Quality Objectives.
- The Netherlands uses a broad, participatory public process which, like Sweden, attempts to build shared understanding more broadly than

just politicians and senior officials. Extensive public consultation, again with strong political leadership, has resulted in the creation over time of a series of National Environmental Policy Plans (the current plan is NNEP4), including vision, goals and decision-making processes, that is enshrined in legislation and is intended to bind all government ministries and agencies.

- In the late 1980's, the State of Oregon created a 20-year strategic vision that was developed using an extensive process of public consultation, based on local community meetings and electronic voting. Oregon officials report that this vision continues to be the benchmark for most policy issues that are brought forward.
- In 1997, the Ontario Government's *Lands for Life* planning process was initiated, which resulted in the *Living Legacy* land protection strategy and the *Forest Accord* of March 1999. This initiative involved extensive and, at some points, highly contentious multistakeholder consultation and negotiation. Participants report that a critical success factor was the extent of shared understanding and common vision that had been established between Ontario politicians and senior officials in the Ministry of Natural Resources.
- In British Columbia, the creation of a multi-ministry vision and policy framework to address crosscutting land protection issues had been developed through conventional interministerial policy development processes. However, ministers remained concerned about the bureaucracy's ability to move forward in an integrated manner across program silos. The solution was to use legislation and a legislated coordinating body to oversee progress on implementation. The decision to use a legislative mechanism to ensure integration of effort was based, in part, on past experience in attempting to address similar crosscutting issues in the social policy field. In the absence of a mechanism similar to that described above, cooperation was short-lived and produced less than optimal results.

3.3.2 Defining the Elements of Good Public Policy

The following are three examples of efforts within jurisdictions to establish common standards and expectations for the content of public policy.

New Zealand

- The New Zealand government produced a handbook entitled: *The Policy Advice Initiative: Opportunities for Management* directed at improving the performance of the policy function. The document sets out criteria for:
    - The content/expected elements to be contained in good public policy.
    - Key characteristics of good policy analysis.
    - Components of implementation planning.
- The document goes further to outline human resources strategies for the recruitment/retention and training and development of policy staff.

Government of Canada

- The Government of Canada reviewed its policy needs and capacity in 1995, through a multi-ministry task force focused on improving the federal policy function. This Task Force, led by Dr. Ivan Fellegi (Deputy Minister and Chief Statistician for Canada), produced the *Strengthening of Policy Capacity* report, which focused on improving policy analysis within departments, policy management across government, personnel and policy work, and policy expertise outside government.

Ontario Ministry of Community and Social Services

- The Ontario Ministry of Community Social Services has produced a definition of good public policy development as part of its *Policy Matters!* initiative (see Section 3.3 for more information on this initiative). This document, entitled *Good Public Policy*, was designed to provide guidance to Ministry staff with respect to defining the elements of good public policy, clarifying senior management expectations with respect to the use of these elements, providing tips and examples of best practices, and a policy quality checklist.

3.3.3 Creating a Central Strategic Policy Capacity

Our earlier research indicated a consensus across jurisdictions on the need to have a central capacity to identify and address strategic issues. In some cases, this capacity exists within a department or ministry, while in others it cuts across ministries. In the environment policy field, our review found a mix of approaches. Many departments did not have a central strategic policy capacity and relied primarily on the traditional, separate media-based (air, water, land) policy offices. Others included some form of central strategic policy coordination – in some cases, a very extensive and strong capacity, in others a more narrow coordinating function. The following are some examples from the environmental field of strategic approaches:

United Kingdom

The United Kingdom provides an example of cross government approach. The UK traditionally maintains a strong central public service policy capacity in the Cabinet Office. The mandate includes developing policy on crosscutting and strategic issues. Specifically in 1998, the Government announced the creation of a special strategic policy unit to deal with the crosscutting issue of "social exclusion". Also within the Cabinet Office is a strategic policy unit reporting directly to the Prime Minister and made up of policy experts from outside the civil service, including lawyers, economists, management consultants, and labour experts. The unit's mandate is to identify and prepare papers on crosscutting issues.

Within the UK's Department of the Environment, Transport and the Regions are two central strategic policy units worth noting:

- *Central Strategy Directorate:* The mandate of this office is to focus on the strategic development of policy, "so that policies across the Department link together coherently and deal with the emerging future agenda". The Directorate accomplishes this in some cases by contributing to the work of other, more program focused policy offices, but also directly develops and monitors policies, particularly with respect to policies directed at longer term, crosscutting issues. The Directorate is responsible for ensuring professionalism of the policy function within the department, including developing strong relations with outside bodies, and issuing guidance on best practices for policy development.
- *Chief Economist's Directorate:* Complementing the work of the Central Strategic Directorate is the Chief Economist's Directorate which focuses on economics, policy appraisal and evaluation, and taxation. It has been assigned the lead on particular crosscutting policy issues (such as energy) and provides policy consultancy services to the Department.

Sweden

The Swedish Ministry of the Environment is an exception to the general practice of organizing by media. The policy functions within the Ministry are structured in an integrated, crosscutting manner, as opposed to media-based manner. Rather than land, air, and water, the Ministry has separate Divisions dealing with, among other areas:

- Environmental quality: including global climate change, environmental adaptation of energy systems, traffic, nuclear safety, environmental monitoring, and education and research.

- Eco-management strategies: including issues related to environmental health, consumer and industrial products, chemicals control, and protection of the ozone layer.
- Sustainable development: environmental aspects of employment and community development, indoor environment, and building/spatial planning and the environment.

This integrated approach is part of the Swedish government's stated direction to the Ministry that policy products will be developed in an integrated manner and that this is crucial to the government being able to meet its stated goal of transforming Sweden into an ecologically sustainable society within one generation.

US EPA

US EPA maintains very large program policy and design offices for air, land, and water, as well as a smaller central strategic policy capacity in the Office of Policy, Economic, and Innovation. This office's stated purpose is to "provide an enhanced focus on *multimedia* policy and innovation to maximize EPA's ability to achieve environmental results." The Office's mandate includes the following crosscutting policy activities:

- Coordinates policy and analysis across all the Agency's offices and regions.
- Provides critical economic analyses to augment and support the Agency's understanding of the financial and societal impacts of environmental policies and regulations.
- Promotes change and Agency-wide integration of new practices.
- Conducts economic research that leads to the development of analytic tools used by federal, state and local governments.
- Serves as the principal advisor to the Administrator (the head of the Agency) in matters pertaining to policies and economics that promote innovative approaches to protecting public health and the environment.

- Provides leadership to ensure new approaches and related policies are identified, designed, and tested by supporting program-specific approaches in other EPA offices.
- Directs a coherent strategy for change in cross-Agency programs.
- Ensures successful new approaches and related policies are incorporated into the way EPA does business.
- Directly manages the development, testing, and implementation of particularly innovative or crosscutting programs, either alone or often in partnership with regional offices.

Other examples include:

- Environment Canada which maintains a Policy and Communications Division, under an Assistant Deputy Minister, including separate offices for Policy Coordination and Strategic Directions, Economics and Regulatory Affairs, and Policy Research. The Division is responsible for, among other activities, strategic and integrated policy development and planning, and the extent to which environmental objectives are considered in the development of economic policies, and economic impacts in environmental policy decisions.

- Alberta Environment (which includes separate divisions for Environmental Services, Lands and Forest Services, and Natural Resources Services) maintains a Corporate Policy Secretariat, reporting directly to the Deputy Minister, which coordinates policy development across the three divisions and deals with crosscutting issues.

- The British Columbia Ministry of Environment, Lands and Parks includes a Corporate Policy Branch, which includes two sections of interest:
    - Priority Policy Initiatives Section: the lead within the organization for emerging public policy issues, develops

policies and program that cut across program areas, and directs public consultation on major policy initiatives.

- Planning and Evaluation Section: among other responsibilities, undertakes program reviews and evaluations, conducts economic analysis and studies of major policy initiatives, develops economic instruments, and undertakes state of the environment reporting.

3.4 MCSS as a Best Practice Policy Organization

In terms of adopting a comprehensive approach to strengthening policy capacity in the public service, our research and discussions with other jurisdictions indicates that the Ontario Ministry of Community and Social Services is an example of an organization that has initiated a comprehensive approach.

The Ministry's efforts encompassed both the substantive component of public policy development, i.e. broader, more complex and knowledge-based understandings of issues and solutions, and the professional development of the policy function as part of the ongoing management within government.

With the frameworks identified in this section as their starting point, MCSS undertook a number of steps:

- Creation of a time-limited Office of Policy and Organizational Renewal, with a clear cross-ministry mandate to steer the policy building capacity within the Ministry and to oversee the development of a broad based Ministry strategy that saw action being taken on all components of the frameworks.

- The development of a Ministry vision for the policy function as a professional discipline within the public service, with the stated goal of achieving the following end vision: *MCSS has been a recognized leader in public policy development, with a strong, knowledge-based capacity for delivering*

strategic, timely, informed, comprehensive policies that address complex, crosscutting social policy issues.

- The establishment of a five-part action plan to address the framework components presented earlier. This action plan was supported by cross-ministry teams led by ADMs and dedicated project coordinators. The ADMs and coordinators together formed a Core Management Team for the project, chaired by the ADM of Policy and Organizational Renewal. The components of the action plan are:

  Policy Management and Leadership:

  - Identify and implement ways and means to strengthen policy management and leadership.
  - Design a set of concrete initiatives to reinforce capacity to manage and lead the policy function.

  Policy Analysis:

  - Improve access to timely and accurate data, information, and knowledge.
  - Build new relationships with policy and research organizations within and outside government.
  - Use Information Technology supports to help acquire, manage, and transfer knowledge.

  Policy Product:

  - Define elements of a good policy product.
  - Improve understanding of the policy development environment.
  - Ensure consistent quality and develop feedback mechanisms for policy analysts and managers.

Successful Policy Process Practices:

- Highlight and showcase new ways of working in a complex policy environment.

Policy Professional:

- Define the attributes of a good policy professional.
- Develop strategies and tactics to retain, enhance, and attract good policy professionals.

Within each element of this framework, the Ministry has undertaken or is in process on a number of best practice initiatives, including:

- Creating a *Policy Matters!* website on the Ministry intranet, where the various frameworks, tools, and other resources are available on-line to policy staff.
- Defining the elements of and Ministry expectations for a good public policy product and creating related quality measures.
- Hosting policy forums on social policy issues and issues related to professional development within the policy function.
- Dedicating time for the Ministry's senior management team to focus on substantive, crosscutting policy issues, as well as the professional development of the policy function.
- Developing a kit of policy analysis and presentation tools.
- Formalizing performance expectations for senior managers.
- Developing a Knowledge Management framework paper.
- Generating an inventory and gap analysis of Knowledge Management practices.
- Developing a human resources retention strategy.
- Developing a human resource competency model for policy.
- Developing generic job descriptions for the policy function.

- Fostering a policy *community of practice* within the Ministry and formally structuring opportunities to network and share issues/expertise.

MCSS's leadership in this area was recognized last year across the Government as part of the ongoing project to restructure the Ontario Public Service. MCSS was assigned the co-lead, along with Cabinet Office, in developing a comparable framework that would apply across the OPS to achieve policy renewal with the public service.

4.0 Current Ontario Context

Overall, our review indicates that the Ministry's approach to the policy function – which we would characterize as very focused on the considerable day-to-day program policy pressures it faces – is consistent with that of many environmental and other government organizations. By this we mean that the Ministry has systematically addressed neither the requirements for a strategic approach to policy development, nor the development of the policy function as a professional discipline within public sector management and administration.

As with many environmental and other organizations, the policy function within MOE is currently organized primarily by program/media silos. Within these silos, the focus is primarily on program policy and program design. Given this approach, and the significant day-to-day program policy pressures facing it, the Ministry currently has a limited capacity to identify, analyze, and manage strategic, crosscutting, multi-ministry, and complex issues.

In terms of central strategic capacity, the Ministry does not have an assigned centre of responsibility for dealing with these kinds of issues. Having said that, the Partnerships Branch is an example of a crosscutting program policy and design branch. However, this branch stands out somewhat as an anomaly within the Ministry. It does not currently have a mandate to formally bridge the program policy silos. Furthermore, it is not integrated into the main policy function of the Ministry. It is currently located in the

Environmental Sciences and Standards Divisions, as opposed to the Integrated Environmental Planning Division (MOE's policy division).

To date, the Ministry – as with many other parts of the Ontario Government and other jurisdictions – has not approached the policy function as a form of discipline within public sector management and administration that requires its own frameworks and professional development. Consistent with this, much of the infrastructure ideally required, i.e. comparable to the MCSS approach, is not resourced or in place.

With respect to the knowledge and information required to support good public policy development, the experience of the policy function is consistent with that of other parts of the Ministry:

- A general decline in the ability to manage external and internal knowledge and information because of limited resources and a lack of clarity with respect to the legitimate role of the public service in this area.
- Steady erosion of historic links to the external information sources required to support policy, including the academic and research communities.
- A lack of definition with respect to the specific knowledge and information required to support crosscutting strategic policy, program policy and program design, implementation planning, and ongoing monitoring and evaluation of policy outcomes.

As discussed in Section 6.0 *Knowledge Management*, current information technology plans do not, at this stage, specifically address the information needs required to support policy formulation for either media-silos or in an integrated manner. The current *Environet* plan is structured to meet, as a first priority, the operational needs of the Ministry and does not currently incorporate the unique policy requirements.

12.0 The Path Forward for Ontario: Recommendations

1. Introduction

In this section of our report, we present our recommendations to the Government for establishing Ontario as a leading environmental jurisdiction. These recommendations encompass the wide range of issues and functions that were included in our review.

We begin this section with a brief but important stage-setting discussion of the magnitude of the change we are recommending. This is followed by a discussion of the important factors that will contribute to the successful implementation of the directions we are recommending, including:

- The need for dedicated organizational capacity to design and implement the changes.
- The importance of allocating sufficient resources to implementation as well as to ***ongoing*** management of the new initiatives.
- The need for implementation to occur within a larger context of Change Management.

Within this overall context, we then present specific recommendations with respect to building an organizational capability – including resources, structures, and processes – to implement the changes and oversee the transition required. Finally, we conclude with a discussion of recommendations in the individual functional areas included in our review.

1.1 The Magnitude of Change

As we have described throughout our report and, in particular, the previous section of this volume, establishing Ontario as a leading jurisdiction in environmental management represents a significant challenge. Our review suggests that the challenge is not one of:

- Tinkering at the margins of existing programs.
- Creating a few new programs to overlay on what is already in place.
- Simply implementing a new information technology system.
- Restructuring various parts of the organization.

Rather, the strategic shifts we identified represent a comprehensive change in the way Ontario approaches its environmental responsibilities. Within this context, our recommendations represent a fundamental, conceptual and philosophical change in thinking and orientation. We are talking not only about program change, but change in culture – attitudes, behaviours, expectations, and roles and responsibilities. Moreover, by *Ontario* we mean the Ministry of the Environment, but also other ministries, the regulated community, NGOs, and ultimately the public.

1.2 Important Factors Affecting Successful Implementation

We have identified three important factors that will contribute to the successful implementation of the new directions:

Creating a Dedicated Implementation/Transition Capability

In our view, successful implementation will require strong leadership and new structures and processes that force the transition to take place and send a public signal that change will occur. To that end, we recommend the creation of a dedicated implementation/transition capacity within the Ontario government. We make this critical recommendation for several reasons:

- The changes we are proposing are broader than a single ministry.
- Successful implementation requires close cooperation and like-mindedness between senior politicians and government officials, as well as structures and processes to provide direction and compel effective participation across ministries and agencies.

- We do not believe, given current critical day-to-day pressures that existing structures within MOE at this time do not have the capability to lead this implementation, including available senior leadership time, organizational resources and experience, and the mandate to direct activities across ministries affected. These could include, for example, Natural Resources (MNR), Agriculture, Food and Rural Affairs (OMAFRA), Northern Development and Mines (MNDM), Health and Long Term Care (MOHLTC), Finance (MOF), Municipal Affairs and Housing (MMAH), Transportation (MTO), and Economic Development and Trade (MEDT).

Allocating Sufficient Resources

As stated above, our view is that implementation and transition management cannot be accomplished within existing structures or within existing resources in MOE or elsewhere. Effective implementation and transition planning and oversight will require:

- Dedicated, experienced, senior leadership at the political level.
- A significant core of human and financial resources in place for a period of at least three to five years, including dedicated high quality senior leadership in the bureaucracy.
- High quality staff from within the OPS as well as externally, representing the diverse range of skills required for successful implementation.
- The expectation that this core of people will draw on additional dedicated resources from across the government as required.

By the same token, we believe that the ongoing operationalization and management of the new approach will require new resources within MOE and, to an extent, in other ministries. This will involve necessary investments in the people and resources required to ensure the ***ongoing*** strategic management of the enterprise, including, for example:

- New skills and abilities, such as those related to negotiation, problem solving, facilitation, analysis and synthesis, and managing public processes.
- Resources to support the implementation of an integrated approach to environmental compliance assurance.
- Resources to support new monitoring systems.
- New capacities to create, share, and use knowledge internally and externally.
- Significant investment in information and information technology.
- The development of formal Emerging Issues and Risk Analysis policies, processes, and capacities.
- Creating new formal and informal mechanisms and approaches to broader outreach and participation of stakeholders and the public.

Adopting a Change Management Approach

As stated above, much of what we are recommending is as much about culture – beliefs, behaviours, attitudes, and values – as it is about programs and infrastructure. Furthermore, the imperative for this kind of change exists not only with MOE, but also with other Ontario government ministries, much of the regulated community, including private industry and municipalities, NGOs, and the public.

Consequently, we are recommending that the development and implementation of the changes – including the operating philosophy and activities of the implementation/transition organization – be conducted within a formal Change Management approach and process. This process should acknowledge and address the changes required both inside and outside the government.

We want to take a moment to talk about common general misconceptions with respect to Change Management. Change Management is often viewed as a form of communications exercise or strategy that is developed at the end of a process. It is viewed as being part of communicating and achieving buy-in for decisions, which have already been made. In fact, Change Management is much more than this. It is a broader and more inclusive approach to building consensus that should be infused into the process from the very beginning, identifying the need for change, creating buy-in, developing specific strategies, and implementation.

Many different descriptions exist with respect to the essential elements of a Change Management approach. Our experience indicates that these descriptions contain the same basic components. We have provided in *Appendix G*, what we think is a particularly useful version of a high-level Change Management checklist, developed by the Government of Ontario's *Centre for Leadership*. This checklist captures the key elements of the way in which Change Management thinking should infuse the process:

- Focusing Priorities to Achieve the Vision.
- Living the Values.
- Constant Communication.
- Continuous Monitoring.
- Meaningful Involvement: "People support what they help create".
- Adequate Resources.
- Aligning Structures.

In viewing *Appendix G*, it is important to bear in mind that it was developed for internal use with respect to organizational design and development. It uses language such as *employees*, *supervisors* and *managers*. As stated earlier, participants in the process would be much broader, both internal and external to government. However, the basic concepts are the same.

Recommendation #1

Implementation/Transition Structure and Processes

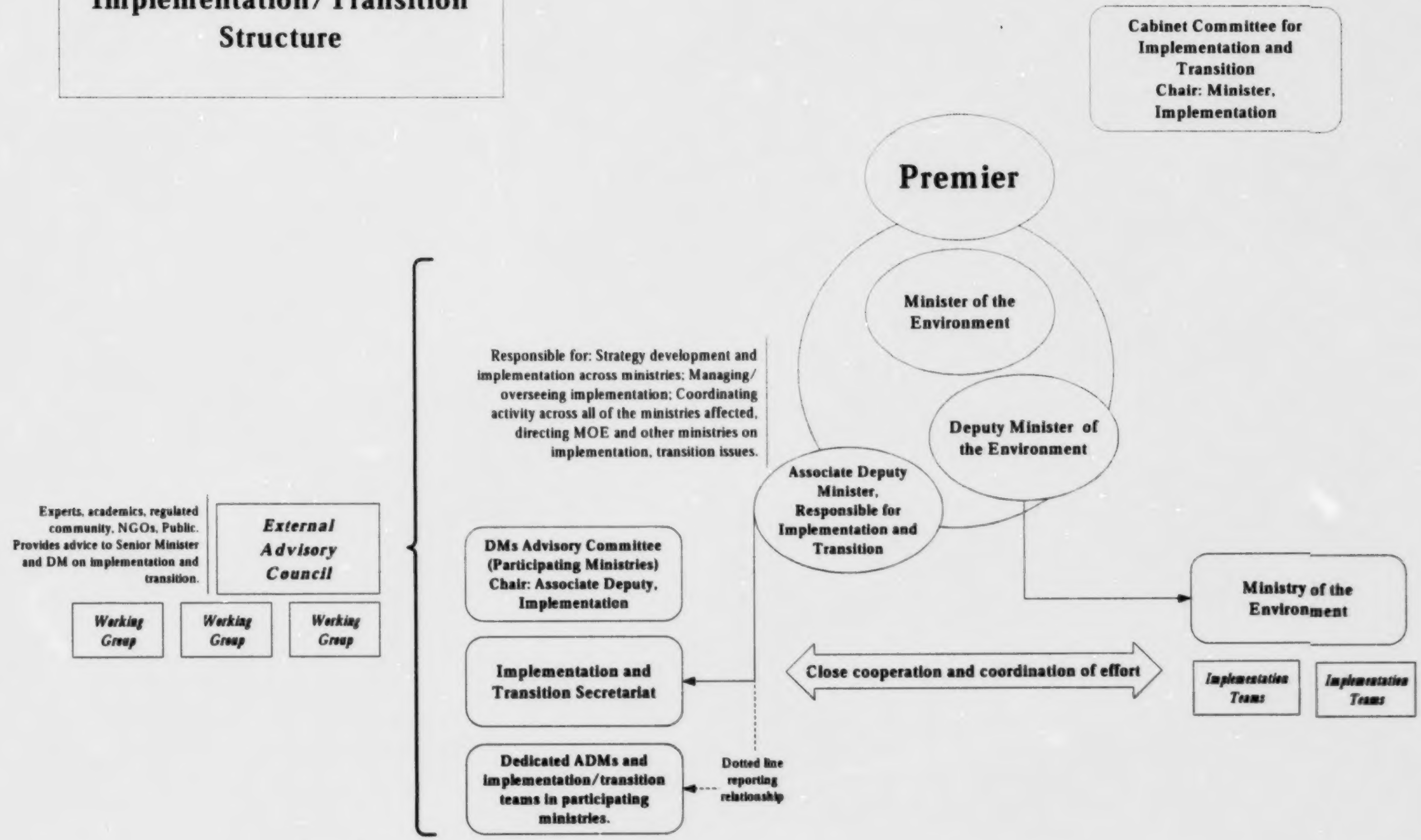
As identified above, we believe that successful implementation will require strong leadership and new structures that force change to take place and send clear public signals. Our recommendations in this respect have several important characteristics, including:

- Creating an organizational focus for implementing the recommendations and managing the transition process, as opposed to day-to-day business within MOE.
- Structures and processes that link and ensure like-mindedness with respect to senior political and public service decision-making.
- Structures and processes that support the implementation of a government-wide vision and implementation strategy by ensuring maximum consistency and coordination across the ministries affected.
- Formalized opportunities for external advice, consultation, and participation in the implementation and transition process.

The diagram on the next page provides an overview of the proposed implementation structure. We envision a need for this structure to remain in place for the extended period necessary to plan and substantially implement the changes, i.e. between three and five years. The proposed structure builds on the leadership of the Minister and Deputy Minister of the Environment, but also includes a number of new elements that are described in more detail below:

- An expanded, cross-ministry leadership role for the Minister of the Environment, supported by a Cabinet Committee Responsible for Implementation and Transition.
- An Associate Deputy Minister for Implementation, supported by an advisory Deputy Ministers Committee.
- An External Advisory Council

Recommended Implementation/Transition Structure


Cabinet Committee for Implementation and Transition
Chair: Minister, Implementation
Premier
Minister of the Environment
Deputy Minister of the Environment
Associate Deputy Minister, Responsible for Implementation and Transition
Responsible for: Strategy development and implementation across ministries; Managing/ overseeing implementation; Coordinating activity across all of the ministries affected, directing MOE and other ministries on implementation, transition issues.
Ministry of the Environment
Implementation Teams
Implementation Teams
Close cooperation and coordination of effort
DMs Advisory Committee (Participating Ministries) Chair: Associate Deputy, Implementation
Implementation and Transition Secretariat
Dedicated ADMs and implementation/transition teams in participating ministries.
Dotted line reporting relationship
External Advisory Council
Experts, academics, regulated community, NGOs, Public. Provides advice to Senior Minister and DM on implementation and transition.
Working Group
Working Group
Working Group

Minister of the Environment

- The Minister would have responsibility for directing the overall development and implementation of the government-wide vision, goals, and strategy, including making recommendations to Cabinet. This would include: overall plan development, establishing priorities, coordinating activities and input across the various ministries affected, implementation, managing the various transitions required, and monitoring progress against expected results.
- This Minister would be empowered to make decisions and give direction to participating ministries with respect to implementation and transition issues.
- The Minister would chair and be supported by a new Cabinet Committee for Implementation and Transition that would oversee implementation and ensure coordinated efforts and participation within individual ministries.
- The Minister would also be supported, through the Deputy Minister, by an Associate Deputy Minister for Implementation and Transition and an Implementation and Transition Secretariat.
- The Minister would receive advice on implementation strategy development, actual implementation, and related transition issues from the External Advisory Council and its Working Groups.

Associate Deputy Minister Responsible for Implementation and Transition:

- The Associate Deputy Minister Responsible for Implementation and Transition would support the Minister in directing and coordinating the development and implementation of the government-wide vision, goals, and strategy. This would include: overall plan development, establishing priorities, coordinating activities and input across the various ministries affected, implementation, managing the various transitions required, and monitoring progress against expected results.

We recommend the assignment of an experienced senior public servant with a track record in this form of complicated cross-ministry and external challenge.

- The Associate Deputy Minister would be supported by:
    - *An Advisory Committee of Deputy Ministers* from the participating ministries, as part of the oversight of the implementation and transition process and to ensure clear and consistent direction within those ministries. This Committee would be chaired by the Associate Deputy. Implementation activities would be formally enshrined in each individual deputy minister's performance contract and in the contracts of individual executives within ministries.
    - *A dedicated Secretariat for Implementation and Transition* responsible for supporting the coordination of efforts across the various ministries, including leading the development of strategies, implementation plans, monitoring implementation activities and results. We envision this Secretariat to be more than a traditional facilitation or coordination body, and to include substantive, relevant expertise in communication and consultation, multistakeholder process, cross-ministry policy development, and program design.
    - *Assistant Deputy Ministers and small, dedicated implementation and transition teams* in each participating ministry. These Assistant Deputy Ministers would have a formal *dotted line* reporting relationships to the Associate Deputy Minister.

- The Associate Deputy Minister would also receive advice from the proposed External Advisory Council.

External Advisory Council

- The purpose of this Council would be to provide *ongoing* advice to the Premier, Ministers, Deputy Ministers, and others with respect to the development of the implementation and transition strategy, its implementation, the *ongoing* management of the transition, and expert advice on specific issues. This approach reflects best practice in other jurisdictions and is also a core element of a Change Management approach. Furthermore, it represents an important signal of the shift towards partnerships, transparency, and shared responsibility.
- The membership of the Council would be targeted at individuals as well as organizations in the environment and related fields, with an emphasis on progressive, forward thinking, positive, and constructive participation. Membership would include representation from:
    - Scientific, research, policy, and academic communities.
    - The regulated community including private industry, utilities, and municipalities.
    - Environmental and other NGOs.
    - The public.
- As indicated in the diagram presented earlier, we envision this Council as having a number of formal sub-committees or working groups that would advise and inform various implementation and transition activities. Some of these sub-committees would be ongoing, while others might be established for a specific, time-limited purpose.
- We recommend that the processes and products of the Advisory Council and its sub-committees/working groups be as open and transparent as possible, including the use of the Internet to share information with and engage a broader audience.

Recommendation #2

Create an Environmental Management Vision for Ontario

We recommend the creation of a high-level, government-wide vision of environmental management that cuts across all affected ministries. This vision would be broadly scoped to provide consistent guidance and direction for all ministries and be clear with respect to roles of those ministries. This direction is consistent with the strategic shift we identified in our review of moving away from one ministry having responsibility for traditional environmental protection and towards a strategic, cross-government approach to leading environmental management.

The vision would include both high-level and detailed outcomes that are clearly and measurably expressed in terms of sustaining human health and ecosystems. New Jersey provides a particularly clear and very human- and ecosystem-focused example of the high-level outcome component. In addition, the vision should address each of the strategic shifts identified in our review, as well as clearly articulate the *end state* that the Government is committed to achieving, i.e. a measurable statement of what will be different for government, the regulated community, NGOs, and the public at the end of the change process. We particularly like the high-level example in the New Jersey Strategic Plan entitled *What Will It Look and Feel Like When We Get There* (see *Appendix D*). The vision would also include:

- Commitments to timeframes for realizing the goals and public access to necessary evaluation information.
- The participation of and input from the proposed External Advisory Committee and its Working Groups.
- The development of a specific component addressing the need for greater and more transparent public and stakeholder participation in priority setting, policy development and local decision-making.

Recommendation #3
Governance for Environmental Management

As indicated in Section 5.0 of our report (*Governance for Environmental Management*), there are many different options for organizing and delivering the various functions associated with environmental management. We found examples of decentralized authority and responsibility to agencies, municipalities, and other bodies for most of the functions of environmental management.

One exception to this rule was that governments tended to retain direct responsibility for policy development, although even in this area there were examples of major efforts to broaden and involve the public and stakeholders in consultation. As indicated in this section, the evidence suggests that these variations are as much or more about the political and governance culture and traditions of individual jurisdictions, as they are about high quality environmental management.

Many jurisdictions place strategic direction setting, policy formulation, standard setting, and other high-level functions in some form of a ***ministry of the environment***, headed by a member of the Cabinet. While strategic planning policy is retained as a core ministry function, there are many examples of governments establishing agencies, councils, other levels of government, and partnerships with outside organizations for policy formulation advice to government. These agencies have politically appointed Boards of Directors or Administrators and are administratively and operationally self-sufficient.

The practice of creating arms-length operating agencies for a wide range of functions, including regulation, has long been part of the tradition of government in Ontario. In addition, part of the stated direction of the restructuring of the Ontario Public Service currently underway is to expand this decentralization of delivery and focus more within government on strategic and program policy development and standard setting. For these reasons, we believe that at some point in the future, the Ontario Government should give careful consideration to the creation of a more arms-length operating agency for operational/program delivery of environmental management, while retaining responsibility for strategic and program policy development, program design, and overall monitoring and accountability for performance.

However, we would not recommend the creation of this type of operational agency at this time. In fact, given the significant changes required, and in particular the cultural change necessary, we would suggest that to do so would only make the initial implementation and transition process more difficult, particularly in the absence of:

- A broader government vision of environmental management.
- The design, development, and, in many cases, the implementation of the necessary processes, structures, and tools required by the new approach.

We would expect that at some point during the three to five year implementation and transition timeframe we identified earlier, the implementation of different governance structures might be entirely appropriate and advisable.

Recommendation #4

Implementing an Integrated Approach to Environmental Compliance Assurance

In our report and the major research document we prepared with respect to environmental compliance assurance, we make the point that a comprehensive approach to compliance assurance is one of the most critical underpinnings of establishing Ontario as a leading environmental jurisdiction. As part of this approach, a strong culture of innovation and public and stakeholder participation is extremely important. Recognizing that no one jurisdiction has developed ideal solutions in all areas, the willingness to adopt a partnership approach to developing and testing new ideas, discarding those that do not work, and building on those that do, is essential.

As such, environmental compliance assurance is a key enabler in terms of the Province's ability to adopt a strong and more focused approach to enforcement and to make the strategic shifts towards continuous improvement, building partnerships, greater transparency, and shared responsibility.

To this end, we are recommending that the Implementation Secretariat – drawing on significant leadership, resources, and expertise of MOE – be directed, as a priority, to provide overall management of the process to design, develop, and oversee the implementation of an integrated approach to environmental compliance assurance. This approach would use all of the tools in the compliance tool kit selectively, effectively and comprehensively. This integrated approach would be performance based, encourage innovation, recognize leaders, provide incentives, offer technical assistance to improve performance, and focus oversight and enforcement on those not meeting performance requirements. It would include:

- Clear requirements enshrined in legislation.
- Sufficient resources to undertake the initiatives.
- Clear performance expectations, transparency and public accountability mechanisms including reporting.

- A clear commitment to involve NGOs and the public in the process and various levels of decision-making.
- Periodic evaluation and adjustments to the program.
- Effective mechanisms for coordinating the activities across MOE and with relevant partners including other ministries.
- New analytical skills to be able to understand the behavioural responses of companies and individuals, as well as market structure, financial management, and taxation.
- Significant training for abatement and enforcement officers to allow them to adjust to and fulfill their new responsibilities.

There are also a number of other, more specific action steps required in this area:

Ensure that there is a strong enforcement presence for those not meeting standards.

- Give MOE the authority to directly impose timely and significant administrative penalties for violations that do not have a major direct impact on the environment, rather than having to rely, to the extent currently necessary, on prosecution before the Courts.
- Support the emerging best practice and pilots that are being managed by the Inspection, Investigation and Enforcement Secretariat at the Ministry of Labour for handheld computer systems. These devices are expected to be able to support inspectors by providing checklists and templates for inspection, regulations, and related material in an accessible form in the field as well as offer the potential to compile and share information on inspections across ministries.
- Publicly establish expectations and commitments for timing related to preparing and processing Crown Briefs as part of the enforcement process.

- Provide additional resources to the MOE Legal Services Branch to ensure that the Branch can meet the new expectations and prevent backlogs from reoccurring.
- Develop a management information system for Crown Briefs that, in future, would be an integral part of the Ministry's knowledge base.

Develop and implement a more strategic approach to environmental approvals.

- The intention would be to revise current legislated approval processes in order to integrate self-certification, tiered, and whole-facility concepts adopted by best practice jurisdictions.
- This action would be taken in consultation with the External Advisory Council and would draw on its leadership to undertake public and stakeholder consultation and create consensus.

Develop a consensus among Ontario stakeholders – including other ministries, the regulated community, NGOs, and the public – regarding the strategic value and appropriateness of using all compliance tools.

- The intention would be to initiate a broad discussion of, and create a consensus for, moving ahead with respect to the full range of tools, including the use of economic instruments, cooperative agreements, compliance assistance and enforcement.
- It would also include the development of principles, preconditions, and policy frameworks for the application of each, and the identification of potential changes in legislation that might be required.
- As stated in Recommendation #2, we recommend that the Implementation Secretariat lead the development of a Government strategy for public and stakeholder participation and input with respect to environmental management.
- Consistent with that strategy and a Change Management approach, the Implementation Secretariat should implement a specific internal and external consensus building strategy, relying, in part, on leadership

from the proposed External Advisory Council. We would recommend that a multistakeholder sub-committee under the Council be established to deal specifically with the area of environmental compliance assurance.

- This process should be seen and utilized as a major opportunity to communicate with and educate the broader public on new approaches. Part of the message to the public – and the regulated community as well – will need to be that strong and effective enforcement will remain the essential and fundamental core of the Province's approach and that the broader range of tools is intended to add to and strengthen, not replace or in any way diminish, this core.

Conduct a series of pilot projects aimed at testing new approaches to integrated environmental compliance assurance and establishing criteria for their use by MOE and other ministries on environment related issues. If successful, institutionalize these approaches in policy frameworks, appropriate legislation and regulation, etc.

Cooperative Agreements:

- We recommend a minimum of two pilots in this area that would incorporate:
    - The criteria for cooperative agreements that was developed by the *New Directions Group* (a self-initiated multistakeholder policy group including NGOs, and industry) as a starting point.
    - A tiered approach that promotes higher levels of performance for increased flexibility and has degrees of public involvement tied to the various tiers.
    - Transparent public reporting and access to performance information.
    - Use of environmental management systems (EMS) such as ISO 14001, as a precondition.
    - A clear focus on accountability for outcomes, with flexibility for industry to achieve agreed upon results.

  - Allow for multimedia/whole facility approaches.
  - A clear public message that compliance with existing laws is part of the *price of entry* to the use of cooperative agreements.

- Based on our discussions with the Canadian Chemical Producers Association (CCPA) and their experience to date in this area, we believe that this association would be an ideal partner for the Government for one of these pilots.

Compliance Assistance:

- We recommend at least two pilots in this area that would build on the work of MOE's Partnerships Branch and reach out to small and medium sized establishments that have not developed the technical capability and management systems to achieve environmental goals. These pilots would:
  - Provide broad and continuing compliance assistance aimed at helping sectors understand all legislative and compliance requirements. The pilots would offer plain English regulations, guidelines, best practice manuals, and technical support staff.
  - Build from the organizational and management experience developed at US EPA and the State of Pennsylvania for these services in the delivery of their Website and 1-800 toll free lines.
  - Focus on those sectors where technical support materials have already been developed. These include auto service and repair, printing, dry cleaning, and metal finishing.
  - Develop one of the pilots with Ontario Business Connects and/or Government Information Centres to work towards the eventual integration of government information.
  - Seek sector-based financial and technical support with a longer-term view to shifting this onus to the individual sectors.

Criteria for Pilot Participation:

- We recommend that the following be included in the criteria for participation in the cooperative agreement and compliance assistance pilots:
    - Organizational capacity with the individual firm or sector (i.e. provincial industry association) to undertake the demands of a pilot.
    - Demonstrated commitment to the principles underlying the concepts.
    - For cooperative agreements, a sector track record of superior compliance or actual performance above current minimum standards.

Economic Instruments:

- We recommend the development of two pilots that would address applications such as user (polluter) pays, tax incentives and disincentives, capital cost allowances, trading schemes, etc. for large and small businesses, as well as the public.
- In addition, we recommend that MOE proceed with, in consultation with stakeholders, the proposed Cap, Credit and Trade System for Ontario to accelerate reductions in emissions of pollutants that contribute to air quality problems.

Develop and implement a "Project XL"-type innovation program.

- The Implementation Secretariat, in consultation with the Ministry and the External Advisory Council, would develop the framework, policy basis, and, where appropriate, any subsequent Regulations required to support this program.
- The program would provide the Secretariat and the Ministry with an opportunity to look at additional effective ways towards improved compliance and continuous improvement beyond minimum standards.
- The work would include designing and developing changes that would be required to MOE structures, reporting relationships, and performance and program measures.

Recommendation #5

Implementing a Comprehensive Environmental Knowledge Management Strategy

One the key findings of our review is that Knowledge Management continues to gain ground as an overarching strategic tool for improving business performance and delivering on results. Leading organizations have recognized implicitly or explicitly that Knowledge Management is the key to implementing their high-level business vision and strategies. These organizations are working towards an organizational culture, information technology environment, and external relationships that will enable effective and efficient Knowledge Management. Leading environmental jurisdictions acknowledge the crucial and strategic role that Knowledge Management plays in being able to achieve their business vision.

As discussed in Section 6.0 of our report, Knowledge Management simply defined is about a planned approach – enabled by information technology – to supporting business strategy with the comprehensive knowledge and information required to carry out that strategy. It involves an organization identifying the full range of knowledge and information that it needs to conduct its business, then acquiring, creating, adding value to, sharing, and using that knowledge and information in all of the various business processes. In government, the latter includes: business planning and strategy development, strategy and program policy development, program design, implementation planning and implementation, operations and delivery, monitoring/evaluation, and education/outreach. In short, how the organization decides what to learn, how it learns, and how it leverages what it learns.

The capacity to take a planned approach to knowledge and information to support environmental management and to use that knowledge and information to support the various business processes involved, is essential to Ontario's ability to move on the strategic shifts. It is particularly important in terms of moving towards an approach that emphasizes continuous improvement and cumulative impact, performance based programming, transparency, and shared responsibility.

With this in mind, we recommend the following:

- The Government's environmental management vision for the Province contain an explicit cross-ministry commitment to Knowledge Management as a fundamental building block for attaining the vision.
- The Government adopt the framework proposed in *Research Paper #5* and develop Ministry and cross-ministry strategies consistent with the principles outlined. These would include:
    - Linking knowledge and business strategies.
    - Articulating and demonstrating a commitment to Knowledge Management.
    - Defining, classifying, organizing, and disseminating types and sources of information and knowledge.
    - Institutionalizing and resourcing the function within ministries.
    - Rewarding the creation, sharing and using of information.
    - Building networks and outreach strategies with communities of interest.
- Ensure consistent, strong senior leadership and sponsorship of initiatives, driven by the core business divisions of the Ministry.
- Investment be made in the technology required to support an environmental Knowledge Management strategy including the identification and acquisition of information required to support the strategic policy, business planning policy/standards formulation and operational requirements. This investment would build on the work done to date in MOE with respect to *Environet* but accelerate those aspects that can allow for the integration of data across media, as well as the sharing and exchange of this information within the Ministry, across ministries, and with external stakeholders. This action will

facilitate the establishment of the proposed emerging issues process, improved access to scientific and technical expertise, and the implementation of our recommendations with respect to public consultation/engagement.

- The strategy build on the new reporting requirements for water to expand the menu of information available to the public.
- Consideration be given to using both Business Ontario initiatives and Government Information Centres to facilitate the Compliance Assurance initiatives referenced in Recommendation #4.

Recommendation #6

Identifying and Addressing Emerging Issues

Our research indicates that no leading environmental jurisdiction has a fully mature Emerging Issues process in place. However, we did learn that all leading environmental jurisdictions are experimenting with mechanisms to formalize how they identify, prioritize and monitor issues that may have a negative or positive impact on human and ecosystem health. In this way, they anticipate that they will be better able to allocate scarce resources to those areas requiring policy or operational action and decisions.

To be successful, this mechanism requires executive leadership, be fully integrated into the planning and decision-making structures of the Ministry, and be resourced accordingly. As presented in our report, it should include a common purpose and goal for an Emerging Issues process, common definitions and classifications for different types of Emerging Issues, and agreed upon scope, methodology, and implementation approach.

To this end, we are recommending that:

- The Emerging Issues process as defined in *Research Paper #6* be adopted as the methodology to be utilized by MOE.
- The Ministry identify an executive lead for the function and be allocated the resources necessary to establish and develop this function, including the information technology infrastructure required.
- The Implementation Secretariat, as a priority, work with the Ministry and the External Advisory Council to create a multistakeholder advisory body to oversee the establishment of the Emerging Issues process, including the process for public participation and consultation. This committee could be a subcommittee of the Advisory Council.
- The Ministry commit to early integration of the Emerging Issues products into the Corporate Business Planning process.

- The Ministry commit to a formal evaluation of the effectiveness/utilization of the Emerging Issues process and products.
- That the Knowledge Management strategy and the communications of that strategy be linked to the Emerging Issues process, identifying the latter as a fundamental knowledge building block.
- As part of the Knowledge Management emphasis on building bridges and re-establishing relationships with the academic/research community, the regulated community, and NGOs, an outreach strategy be developed that is specific to the *concern* phase of the proposed life cycle framework (*see Section 7.0*).

Recommendation #7

Access to Scientific and Technical Expertise

Our research indicates that leading environmental jurisdictions invest significant time and financial resources in ensuring that they have state of the art scientific and technical information so that they are better able to:

- Identify health and environmental risks in a timely and credible manner.
- Access the technical expertise required to manage, eliminate or mitigate these risks.
- Use this information to develop broad internal and external understanding of issues, risks, and potential solutions.

We recognize that MOE and Ontario, as with most other jurisdictions, will continue to rely heavily on the research and technical expertise of leading jurisdictions. However, we also believe that it is crucial that those ministries with mandates related to environmental management be able to partner with academia, the private sector and other jurisdictions in areas that have significance for Ontario.

In this regard, we recommend that:

- The Implementation Secretariat, in conjunction with those ministries encompassed by the Government's environmental management vision, establish, prioritize, and resource a multi-ministry environmental research agenda.
- The Secretariat, with the External Advisory Council, establish a research sub-committee to assist in shaping the short and long-term research priorities and to oversee the quality of the research acquired. In this regard, the Secretariat should work with the ministries affected to ensure that the mandate, scope and membership of the sub-committee is defined.

- The Province establish an Environmental Research Fund that would conduct focused research and lever research with partners to bring their skills and knowledge to environmental problems of concern to the Province and that both the research agenda, peer reviews, and final products be made available to the public.

- The Ministry provide ongoing staff training in science and technology and establish an outreach agenda for staff at all levels to re-engage the research, scientific, academic, regulated, and consulting communities both formally and informally on key priority areas.

- The Knowledge Management strategy and the communications of that strategy be linked to this initiative, identifying it as a fundamental knowledge building block..

Recommendation #8

Environmental Monitoring and Reporting

Our review concludes that leading jurisdictions recognize the critical role that access to high quality monitoring information and the ability to manage, analyze, use, and report/share that monitoring information plays in effective environmental management and public confidence. Within this general trend, we identified a number of more specific developments, including:

- Monitoring information and the timely and transparent reporting of that information is a critical component of an overall Environmental Knowledge Management strategy.
- Leading jurisdictions are moving towards monitoring and reporting systems that integrate data to support more complex planning and decision-making, including place-based approaches.
- Changes are taking place in what is being monitored to better define human and ecosystem health and the effectiveness of environmental management systems.
- Ensuring public access through the Internet to monitoring information, including an extensive range of tools and access points, is increasingly seen as part of creating confidence in the system, strengthening accountability, and broadening public participation in decision-making.
- Ensuring that responsibilities of system partners are being met through the establishment of clear performance targets, accountability mechanisms, and ongoing monitoring and performance evaluation.
- In leading jurisdictions, the creation of ***ongoing*** monitoring and reporting partnerships with the regulated community, NGOs, the public and other jurisdictions is becoming more important given limited government resources and the increasingly complex nature of environmental management.

Given the above, we recommend the development of a comprehensive environmental monitoring and reporting strategy for the Province, as a component of the overall Environmental Knowledge Management strategy, that:

- Is based on broad multistakeholder – internal and external to government – participation at all stages in the development of the strategy.
- Identifies the full range of monitoring information that should be in place to support high quality, place-based planning and decision-making across the full range of government functions, including strategic business planning, policy development and standard setting, program design and implementation, *ongoing* program delivery, and monitoring/accountability for results.
- Specifies and fills the current gaps/lapsed areas in existing monitoring information.
- Places a strong emphasis on and develops mechanisms to ensure transparency and public access – including "real-time" access where appropriate and practical – to all types and sources of monitoring information and analysis as part of facilitating their involvement in decision-making. This access will also better support other processes such as local land-use planning and community development.
- Modifies existing performance and supporting program measures to reflect the new government vision and establishes related performance monitoring and management systems.
- Identifies the opportunities for partnerships to be developed with the regulated community, NGOs, other organizations such as Conservation Authorities, and the public.
- Ensures that information is integrated and shared across jurisdictional boundaries. This is particularly important given the fact that many of Ontario's most significant environmental issues are, in fact, cross-border issues.
- Draws on the External Advisory Council to provide leadership to the process of developing stakeholder support for the new monitoring program, as well as providing advice and input concerning its *ongoing* management.

In terms of more detailed actions to be taken, we recommend that the proposed monitoring strategy include the following initial priorities:

- Commit to a comprehensive, renewed monitoring program with early investment in improving the water quality components, including Great Lakes and related monitoring, and investing in the development of indicators and bio-monitoring approaches.
- Commit to the early integration of existing environmental databases and as a first step bring data and information together on a watershed basis.
- Continue its commitment to make information available to the public by making monitoring information and information obtained from the regulated community available as soon as it is available.
- In consultation with the External Advisory Council, create an Access Ontario Website focused on monitoring and reporting information – analysis, but also access to data – that is easy to understand and use by the specialized and general public as an early component of a public engagement strategy.

Recommendation #9

Risk Analysis

As identified in our review, science-based risk assessment – the primary tool used to develop standards – has long been a critical component of environmental regulation. However, leading jurisdictions are now developing and implementing a more comprehensive approach to meeting the more complex demands of environmental management, including the strategic shifts identified by our review. This more comprehensive approach is referred to as *Risk Analysis*, incorporating risk assessment, risk management, and risk communications.

Based on our understanding of this emerging best practice and our awareness of the critical role that a capacity for high quality Risk Analysis plays in effective environmental management, we recommend that the Implementation Secretariat work with MOE and the Inspections, Investigations and Enforcement Interministerial Working Group (II&E) to develop a policy framework for environmental Risk Analysis. This framework would:

- Be mandated for consistent use within MOE and other affected ministries.
- Build on the work currently underway through the SWAT initiative.
- Clearly articulate the expected role and mandate of Risk Analysis in environmental decision-making and *ongoing* environmental management.
- Have the potential to be applied to the *ongoing* management and operations of the Ministry, as opposed to just environmental issues.
- Incorporate the definitions, principles, and characteristics identified in our research, including:
    - Formally integrate risk assessment, risk management, and risk communication.
    - Be developed through an inclusive and participatory process.

- Be broad and comprehensive, i.e. incorporating concepts such as risks to human health, risks to ecosystems, and overall quality of life.
- Be open and transparent.
- Be based on the notion of creating and maintaining partnerships throughout the process.

Our assessment is that the work in this area of the II&E Working Group led by the Ontario Ministry of Labour is very consistent with, although necessarily narrower, than the approach we are recommending, particularly in the area of risk communications, and would provide the Secretariat with an excellent starting point for further development.

With this framework in place, we also recommend:

- The creation of standardized analytical tools and expectations for use in the risk analysis process, including: Cost Benefit Analysis, Cost-Effectiveness Analysis, and Comparative Risk Analysis.
- That early opportunities be created to pilot the use of these tools in actual risk analysis and decision-making situations. We suggest that one of these pilots move beyond strictly *environmental* Risk Analysis to be considered for use in supporting the *ongoing* management and operations of the Ministry.

We also recommend that Ontario begin work to establish an approach that is focused on *ecological risk assessment*, i.e. *multi-chemical/multimedia/place-based*, comparable to efforts in this area currently underway in US EPA. In making this recommendation, we recognize that an interim step in Ontario may be necessary, i.e. one that focuses on *single-chemical, multi- media/place-based*, as opposed to a more comprehensive *ecological risk assessment*.

Recommendation #10

Policy Development

In the Government of Ontario's vision of the Ontario Public Service of the future, as articulated in the *Building the OPS for the Future* initiative, policy development is and will continue to be one of the Government's most important core businesses.

Our earlier work in this area indicates most jurisdictions are struggling to deal with how to strengthen their policy functions. As such, best practices are still emerging in terms of articulating the importance of policy development in public service, conceptually understanding its component parts, and designing and developing the necessary supporting infrastructure. An example of leadership in this emerging area exists already within the Government of Ontario, through work that has recently been led by the Ministry of Community and Social Services (MCSS) and the Cabinet Office. Similar advances have been made in the Government of Canada.

The following are our recommendations with respect to implementing these best practices within the Ministry of the Environment.

- Confirmation by and commitment from Ministry senior management that the policy development capacity within the Ministry needs to:
    - Include a strong crosscutting, longer-term, strategic component, as well as the traditional emphasis on more immediate program policy and program design.
    - Create a separate strategic policy unit within the Integrated Environmental Planning Division to focus on crosscutting policy issues that require a strategic response. This unit would also be responsible for economic advice and analysis.
    - Significantly strengthen the program evaluation component of the policy development process.

  - Be defined, developed, nurtured, and rewarded as a recognized discipline within the public service that cuts across traditional program boundaries.
  - Be supported by structures, processes, tools, and information technology developed and implemented specifically to support a high quality policy development function.

- Creation within the Policy Division of a small secretariat charged with the task of leading the transformation of the policy function. Specific activities would include:
  - Developing mechanisms for ensuring the involvement of staff at all levels within the policy function in the process and the actual design and development of new approaches.
  - Developing a vision of the policy function in the future that sees the Ministry as a recognized leader in public policy development, with a strong knowledge-based capacity for delivering strategic, timely, informed, comprehensive policies that address complex, crosscutting environmental issues.
  - Identifying specific knowledge and information required to support the full range of policy development activities and the gaps that currently exist in that knowledge and information (would include strong linkages to the development of the proposed Environmental Knowledge Management strategy).
  - Identifying the range of skills and competencies required within the Ministry or externally and clarifying the gaps that exist.
  - Taking steps to ensure that the policy development function, and its knowledge and information requirements are well represented in the design and development of the proposed Environmental Knowledge Management strategy, including the specific components of:
    - Emerging issues.
    - Access to scientific and technical expertise and other disciplines.

    - Operational information.
    - Monitoring and reporting.
    - Evaluation information.
    - Knowledge and expertise within individuals.

- We further recommend that MOE draw on the recent work of MCSS to put in place a Change Management-oriented approach to transforming the policy function. This would include specific policy related infrastructure – structures, processes, and tools, such as:
    - o Establishing dedicated senior Ministry management team time to focus on policy issues and the policy function, as a parallel to time spent on management issues.
    - o Putting in place a definition of the elements of a good public policy product and policy development process and enshrine those elements in performance expectations within the Ministry.
    - o Creating policy *tool kits* containing information about the elements of good public policy development, examples of best practices, and other advice, making these available on the Ministry intranet.
    - o Establishing core competencies for the policy function and creating related training and development plans for staff at all levels.
    - o Conducting regular policy forums for policy staff that focus on issues both crosscutting/substantive (i.e. environment) and professional (i.e. the development of staff capacity as policy professionals).
    - o Creating formal and informal information networks – practice communities, in the language of Knowledge Management – within the Ministry's policy community that focus on sharing expertise, best practices, lessons learned, examples and discussion of good and bad policy products, etc.
    - o Implementing a Ministry-wide recognition program for policy staff.

Appendices

Appendix A:
Project Team Members

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Appendix B:

External Organizations Consulted

1. Alberta Ministry of the Environment
2. Alliance of Manufacturers and Exporters
3. Automotive Parts Manufacturers Association
4. California Environmental Protection Agency
5. Canadian Chemical Producers Association
6. Canadian Federation of Independent Business
7. Canadian Embassy, Washington D.C.
8. Canadian Environmental Industries Association
9. Canadian Institute for Environmental Law and Policy
10. Canadian Petroleum Producers Institute
11. Canadian Plastics Industry Association
12. Canadian Vehicle Manufacturers Association
13. Cement Association of Canada
14. Conservation Council of Ontario
15. Dofasco
16. Dow Chemical
17. Environment Canada
18. Falconbridge Ltd.
19. Florida Department of Environmental Protection
20. Ford Canada
21. Environmental Council of States (US)
22. General Motors

23. Grand River Conservation Authority
24. Hamilton District Auto Body Repair Association
25. Imperial Oil
26. US Center for Watershed Management
27. National Governors Association: Center for Best Practices
28. New York Department of Environmental Protection
29. Ontario Clean Water Agency
30. Ontario Mining Association
31. Ontario Municipal Water Association
32. Ontario Superbuild Corporation
33. Oregon Environmental Quality Department
34. Pennsylvania Department of Environmental Protection
35. Pollution Probe
36. Proctor & Gamble
37. Thorne Butte: Decision Partners Inc.
38. Toronto Environmental Alliance
39. United States Environmental Protection Agency
40. Walkerton Commission of Inquiry
41. York University

Appendix C:

Research Papers in Volume 2

1. Environmental Compliance Assurance: A Review of International Best Practices, *Executive Resource Group*

2. Economic Instruments for Environmental Policy Making in Ontario, *International Institute for Sustainable Development*

3. Review of Governance Models in Environmental Management, *Stratos Inc.*

4. A Review of Selected Canadian Agencies as Possible Environmental Management System Models for Ontario, *Joseph F. Castrilli*

5. Creating Leading Knowledge and Information Management Practices, *IBM Canada*

6. Emerging Issues and the Ministry of the Environment, *P. Victor, E. Hanna, J. Pagel, York University*

7. Access to Scientific and Technical Expertise, *Dillon Consulting*

8. Environmental Monitoring: Leading Jurisdictions, *Beak International*

9. Review and Analysis of Best Practices in Public Reporting on Environmental Performance, *Michael Keating*

10. Risk Analysis in a Complicated World, *Dr. K.M. Thompson, Harvard Center for Risk Analysis*

11. A Review of Watershed Management Experience, *Beak International*

12. Wastewater Discharge Permitting and Public Involvement, *Pollution Probe*

13. Investing in Policy: Report on Other Jurisdictions and Organizations, *Executive Resource Group*

Appendix D:

New Jersey Department of Environmental Protection

A summary of the Department's vision, mission and six strategic goals that furnish the environmental management foundation for a sustainable state and a description of how the system will be different when these goals are achieved.

Vision:
The vision expresses our long-term goal as an organization.

- *The Department of Environmental Protection is committed to promoting a sustainable high quality of life for the residents of New Jersey.*

Mission:
The mission defines our organization's purpose.

- *To assist the residents of New Jersey in preserving, restoring, sustaining, protecting and enhancing the environment to ensure the integration of high environmental quality, public health and economic vitality.*

Strategic Goals:
The Strategic Goals express the long-term goals we are striving to achieve.

- **Clean Air:** The air throughout the state will be healthful to breathe, and air pollutants will not damage our forests, land and water bodies.
- **Clean and Plentiful Water:** New Jersey rivers, lakes and coastal waters will be fishable, swimmable and support healthy ecosystems. Surface and ground water will be clean sources of water. Every person in New Jersey will have safe drinking water. Adequate quantities of surface and ground water will be available for all uses.
- **Safe and Healthy Communities:** Every New Jersey community will be free from unacceptable human health and ecological risks due to direct exposure from hazardous substances and other potentially harmful agents. Natural resources will be managed to protect the public from floods, fires and storms.
- **Healthy Ecosystems:** The health, diversity and integrity of New Jersey's ecosystems will be restored, protected, enhanced and sustained.
- **Abundant Open Space:** Natural and scenic landscapes will be preserved and every person will have the opportunity to visit an abundance of well-maintained parks, forests, wildlife areas and historic sites. The public will learn about natural and cultural resources, and have access to a wide variety of recreational experiences.

NJDEP: What Will It Look and Feel Like When We Get There?

The following section describes what it will be like when the vision is achieved.

By the year 2002, decisions affecting natural resource systems will be guided by the understanding that all aspects of life in New Jersey are interconnected, interdependent and cumulative. The Department is mindful of the needs of this generation and future generations when it sets goals and policies to promote plentiful supplies of clean water, healthful air quality, safe and nurturing communities, vibrant ecosystems and sufficient open space to occasionally enjoy solitude in a densely populated state. Progress toward achieving our goals will be measured by environmental results, not by counting permits issued or fines collected.

These changes will work a powerful and positive influence on New Jersey's environment. Planned, compact growth will help curtail the destruction or irreversible altering of natural resources. Throughout New Jersey, we all understand and appreciate that our state's natural resource systems are fundamental to our economy, communities and quality of life. We have learned that the choice between jobs and the environment is a false one. When we destroy or irrevocably alter our natural systems, we inevitably end up paying a much greater price, such as when we suffer flooding because we have built on flood plains and destroyed wetlands. We are learning how to design with nature, to match our needs with essential natural processes.

Financial incentives and regulatory reform are resulting in green businesses and technologies that will provide jobs and profits while improving the environment. We are making the transition from a system of strict regulations to one of cooperative goal setting and flexible means of achieving those goals. Conservation incentives and regulatory strategies will in-crease competition and harness private markets for the public good and will reduce energy costs. At the same time, emissions trading will reduce the cost of restoring and maintaining air and water quality. Cooperative planning, often based on watersheds, will more effectively protect environmental resources and the maintenance of large contiguous tracts of open land and healthy ecosystems. Many of New Jersey's indigenous species have rebounded and will continue to flourish. Eco-tourism continues to grow in popularity and importance to local economies.

New Jersey's waterways and coastal areas are prospering and will prosper in the future, supporting a healthy commercial fishing industry and attracting large numbers of visitors throughout the year. Careful planning along New Jersey's coast will continue to avert irreparable damage to the delicate beach environment and will contribute to the protection, restoration and enhancement of coastal land and water habitats. Planned recreation areas along rivers and adjacent cities, towns and rural areas will provide a wealth of opportunities for nature lovers as well as sports enthusiasts.

Appendix E:

US EPA: Chesapeake Bay Cross Media Modelling

Excerpt from: www.epa.gov/vislab/svc/projects/CBAY/

In 1996, the Smithsonian Awards Program recognized the Chesapeake Bay Program Office's Integrated Models of the Chesapeake Bay Watershed, Airshed and Estuary visualization project as an innovative use of high performance computing and environmental models.

Increasingly, we are finding that the area affecting a body of water can stretch beyond the boundaries of the watershed. The scale required for attainment of the least cost solution determines the boundary of this larger area. The Chesapeake Bay airshed is estimated to be 910,000 km^2, an area more than five times that of the watershed. Emission sources in the airshed contribute about 75% of the atmospheric nitrate deposited on the Chesapeake watershed. Excess nutrient loads have reduced water quality and stocks of living resources far below their historic levels. Of the 170.8 million kilograms of nitrogen delivered to the Chesapeake in an average year, 23% are point source loads, 68% are nonpoint source loads, and 9% are air deposition loads directly to tidal Bay surface.

Cross-media assessment, combining air and water management through integration of air and water quality models, is a cornerstone of new efforts to restore Chesapeake Bay.

EPA is linking together air and water simulation models in order to (1) assess the impact of air pollution controls on nitrogen loading to the Bay, (2) assess the benefit of these controls on Bay restoration, and (3) link the models more effectively by reducing the temporal and spatial mismatches between the individual air and water models.

These integrated models are the first and largest application of a regional multimedia analysis of the airshed, watershed, and coastal waters. The success of the application in setting real, achievable, and broadly supported reduction goals, and in tracking the progress toward achieving the nutrient reductions has been outstanding.

Three Principal Models

The Chesapeake Bay Program has embraced the development and use of computer models to help guide their restoration actions. The models help define who or what contributes nutrients and help answer the question, "How much needs to be controlled and where?"

Model History

- ***Watershed Model:*** The first version of the watershed model was completed in 1982 and the model has been in continuous use since then. The findings of the initial watershed model were the inventory of point source and nonpoint source loads for each basin, and the importance of nonpoint source loads. Subsequent versions of the model came out in 1987 and 1992. The 1987 version demonstrated the importance of animal waste loads in the Chesapeake Bay nutrient budget, and the 1992 version confirmed the importance of atmospheric deposition loads. The Phase III version of the Watershed Model is calibrated and fully operational on the National Environmental Supercomputer Center (NESC). The latest version of the Watershed Model (Phase IV) is due to be completed in the spring of 1996. The US EPA Chesapeake Bay Program Office is the lead agency for the Watershed Model.

- ***Estuarine Model:*** The estuarine model began development in 1987 and was completed in 1992 as a linked model with the watershed model. The estuarine model confirmed the water quality benefits of the 40% nutrient reduction goal. The predecessor of the estuarine model was the steady state model completed in 1987. The steady state model simulated steady state summer water quality only, but helped establish the 40% reduction goal and the importance of combined controls of both phosphorus and nitrogen in the Chesapeake. The latest version of the estuarine model will include simulation of major living resource components and is due for completion in early 1997. The US Corps of Engineers Waterways Experiment Station is the lead agency for the estuarine model.

- ***Airshed Model*:** Work on the airshed model began in 1983 and was completed in 1989. The airshed model has provided predictions of nitrogen deposition to the Chesapeake Bay and watershed under different stationary and mobile source management conditions. The airshed model is calibrated and fully operational at the NESC. The US EPA National Exposure Research Laboratory is the lead agency for this model.

Linking the Three Models

The first stage of cross-media model development was in 1992, when the watershed model and the estuarine model were linked, and the watershed became internalized in the calculation of Chesapeake water quality. Linkage of the airshed model and Phase III watershed model was completed in 1995. The next stage, linking watershed, estuary, living resource, and airshed models, was completed in 1997.

Three additional models are the cornerstone of current cross-media work:

1. The Regional Acid Deposition Model (RADM) for atmospheric deposition.
    - The 3-D atmospheric model tracks the transport and transformation of emissions of nitrogen oxides due to the burning of fossil fuel. It calculates the nitrogen load deposited on different land and water surfaces across the watershed and the Bay.
2. The Hydrologic Simulation Program Fortran model for nutrient flow in the watershed to the Chesapeake Bay.
    - The 3-dimensional Bay water quality model simulates water movements and chemical and biological activity within the Bay

waters, calculating the water quality and amount of dissolved oxygen available to the aquatic resources.

3. The three-dimensional Chesapeake Bay Water Quality Model (CBWQM) of response to nutrient loading.
    - The watershed model calculates the amount of nutrients that come from different land and urban areas throughout the Bay drainage, and estimates how much of those nutrients get into the rivers and streams and finally end up in the Bay.

In addition, a weather model is used to drive the atmospheric model, and a separate three-dimensional hydrology model is used to simulate flows in the Bay. The atmospheric model is the most computationally intensive and has the greatest temporal/spatial mismatch. It is being moved to a scalable parallel system.

Appendix F:
Pennsylvania Department of Environmental Protection

(Provided by the PDEP)

EFACTS Information System Background

(Environment, Facility, Application Compliance Tracking System)

The Department of Environmental Protection (DEP) recognizes that our first obligation is to bring individuals, businesses and local governments into compliance with environmental laws and regulations using all the tools we have available.

DEP believes reporting to the public on compliance with environmental requirements should be a fundamental element of all our programs. Good reporting is necessary to maintain credibility with the public and to get better compliance from those facilities DEP regulates.

In January 1997, DEP became the first environmental protection agency in the United States to report on-line inspection, violation and compliance information. Since that first version, DEP has made many enhancements including improving the ways a citizen can search the database, making more information available on a single page and enhancing system performance.

During the first two years of the Compliance Reporting System, the Department defined compliance to mean having no unresolved violations of significant environmental and health protection requirements. Based on public input received through seven roundtable discussions, we have decided to stop using the terms "significant" and "minor" to describe violations. We will now define compliance to mean having no unresolved violations of environmental or health requirements.

The Department of Environmental Protection has developed this comprehensive environmental compliance information reporting system to give the public access to permitting and compliance information on individual facilities by program and by geographic area. This kind of system is now possible because of agency-wide improvements DEP has made to its internal information management system, not because of any increased reporting by facilities regulated by DEP.

We now recognize there are dozens of ways to bring people into compliance - adoption of environmental compliance systems that identify problems and solve them, environmental audits with compliance plans and schedules, technical assistance so facilities better understand what is required, permit reviews, inspections and enforcement actions like notices of violations, orders, civil and criminal penalties.

We also know that some businesses have elected to eliminate emissions or discharges as a way to bring themselves into compliance. Implementing a zero emissions philosophy and achieving it means no permits or inspections or costly control strategies - the ultimate in reducing compliance costs and in maintaining compliance.

Before 1997, DEP could tell you it performed an average 76,000 inspections, reviewed over 15,000 permit applications, received over 48,000 monitoring reports, issued 7,609 notices of violation, wrote over 913 compliance orders, collected over $7.7 million in penalties and $7.1 million in cleanup costs and funded over $1 million in local environmental improvement projects in a given year.

What these numbers cannot tell you is whether or not these actions really brought a facility or a group of facilities with a particular permit into compliance. It also does not tell you whether or not the facility down the street is in compliance, had a violation-free inspection, or went beyond the minimum to adopt significant pollution prevention or zero discharge measures. Nor does it tell you if the measures taken had any real positive impact on the environment.

The faults with the previous reporting systems were highlighted vividly in the report of the DEP's Citizens Advisory Council on reporting "significant" air quality violators. In that case many of the violations turned out not to be all that environmentally "significant." The "significant" violators list also gave no program-wide perspective by noting even basic information like the fact that the list then contained only 16 or so "significant" violators while DEP regulated more than 850 facilities with 12,000 sources of air pollution statewide. It also missed the point that all but a few of the 16 "significant" violators had either resolved their violations or were taking steps to do so. "Significant" became an administrative definition that did not indicate whether or not the environment had suffered.

In addition to these problems, none of the existing compliance reporting systems are made available to the public in an easy-to-use way. Typically, detailed paper file reviews are needed to determine facility compliance. Program-wide compliance information was sketchy at best in most programs.

Agency-wide compliance information was almost nonexistent until now. DEP's new eFACTS (formerly known as the DEP Compliance Reporting System) will help DEP identify compliance problems and opportunities for promoting pollution prevention, and to determine where to direct staff and budget resources. eFACTS information will increase public environmental awareness and give constituents a means to judge the agency's performance on individual cases.

The new **eFACTS** (You've already explained the acronym at the beginning of the appendix) has been designed to achieve several basic objectives:

- To provide department-wide information on the multiple programs that regulate facilities.
- To provide information to the public on permits issued by DEP and the status of pending permit applications.
- To determine compliance rates for each of our programs so they can be tracked and compared year to year.
- To provide accurate, up-to-date information on compliance available for individual facilities so people

know what is happening locally for the first time and as an incentive for facilities to keep in compliance.

- To document the steps taken to achieve compliance (environmental audits and management systems, permits, inspections, notices of violation, orders, etc.).
- To use this information as a management tool within DEP to identify non-compliance problems and how the agency plans to address them.
- To help document pollution prevention efforts as a strategy for compliance.

Achieving these objectives means DEP will be able to answer the basic questions the public has about environmental compliance:

- What regulated activity occurs at a particular location?
- Are facilities in my community in compliance?
- What is the percentage of similar permit holders in compliance?
- What are the most frequent violations?
- What steps are being taken to deal with them?
- What steps are being taken that go beyond compliance to prevent pollution?

Again, improvements in data management technology and new tools like DEP's website make these reporting efforts possible, without having to increase reporting by facilities regulated by DEP.

Appendix G:
Centre for Leadership Change Management Checklist

1. Focusing Priorities to Achieve the Vision

- There is a clearly articulated sense of direction.
- Priorities throughout the entire organization are realigned to focus on achieving the vision.
- Managers and supervisors reorder their own priorities in line with the change outcome.
- Managers and supervisors work with front line staff to ensure they understand the new direction and also take steps to assist them to reorder their priorities in line with the new direction (80 - 20 rule).
- Avoid the activity trap; i.e. eliminate activities that do not substantially contribute to the new direction.

2. Living the Values

- The values of the organization are "lived", not just talked about.
- Opportunities are sought to demonstrate that decisions are made in accordance with the values.

3. Constant Communication

- All senior executives are visible in their support of the change and assume responsibility for communication within, and between, their areas of responsibility.
- Employees understand why the change is required and the desired outcome (the corporate vision).

- People at all levels in the organization have a clear and realistic expectation of what impact the change will have on them and their jobs.
- As much as possible, employees receive communication directly from their supervisor.
- Effort is made not only to disseminate information, but also to ensure the message is received intact, that it is understood by the recipients and that it is applied towards the change outcome.
- Various communication strategies are in place to get information and feedback from various stakeholders.
- Feedback is timely and accurate so that managers can take prompt action.
- Two-way communication is maximized. Real communication is two-way and interactive. As the change effort unfolds accurate, positive information is provided that celebrates successful progress toward the change goal.
- The communication strategy is tailored to the organizational culture.
- Managers are trained to participate in any communications effort.

4. *Continuous Monitoring*

- Key performance measures, which detail how success will be measured are articulated at the planning stage.
- Mechanisms are in place to measure progress on the key services to be maintained.
- During implementation, progress is monitored carefully and adjusted accordingly.
- Progress (and lack of progress) is reported. Implementation problems are acknowledged as well as successes. Monitoring mechanisms act as early warning signals for potential slippage.
- Individual accountability is clearly articulated and measured

5. Meaningful Involvement: "People support what they help create"

- Employees at all levels of the organization have the opportunity for involvement in shaping the future (planning stage). This is particularly important when the contemplated change will directly affect their day-to-day work.
- Provide opportunities for employees to express resistance.
- Employees at all levels of the organization are involved in the implementation.
- The boundaries and limits of participation are clearly defined in advance to avoid encouraging unrealistic expectations.
- There is an atmosphere of collaborative problem solving with employees. Their ideas and solutions are sought and included wherever possible.

6. Adequate Resources

- Sufficient time is allocated for the initiative to be implemented properly.
- Sufficient financial resources are allocated to implement the initiative.
- Attention is paid to human resources. All employees have "just in time" access to the training, information, support and resources they need to implement the change successfully.
- Managers receive the training they need to lead the various aspects of change in their organization.

7. Aligning Structures

- Recognition and reward systems are re-evaluated and readjusted to ensure that they are aligned to the desired behaviour for successful implementation.

- Rewards go to those people who make a visible and significant contribution to successful implementation.
- Human resources policies and practices such as hiring and promotions are examined and, if necessary, changed to bring them into line with the desired behaviours and abilities.
- Decisions on space and facility locations are made in accordance with the desired change outcomes.

Appendix H:

UK Environment Agency Research & Development Strategy

Excerpts from:United Kingdom Environment Agency Research and Development Strategy

Source: Dr R J Pentreath, Chief Scientist and Director of Environmental Strategy, UK Environment Agency

Mission

Our mission for R&D is: *To contribute to a better environment by delivering practical research and development results based on high-quality science, engineering and technology.*

Our aims and objectives for R&D are to:

- Ensure that our R&D Programme supports the main issues facing our business functions;
- Ensure that our R&D Programme establishes, and benefits from, links and co-operation with similar research being funded by other organisations;
- Help to set the agenda for future environmental R&D in both the UK and the EU;
- Ensure that the highest standards of research management are met and that clear benefits and
- Value for investment are achieved from the results;
- Produce outputs which are fit for purpose and, where appropriate, generate income from them;
- Maintain and improve the scientific and technical expertise of our staff.

The main areas of the R&D Strategy are:

- The business context of the Agency's R&D
- Identifying the Agency's R&D needs
- Delivering the R&D and measuring success
- Taking forward the R&D strategy
- The four frameworks
- The Agency's planning and reporting framework Annexe A
- Assessment of the Agency's R&D Programme Annexe B
- Other R&D Players (with whom we will develop our links) Annexe C

Foreword

The Environment Agency is a new body. It has a wide range of legal duties and powers relating to different aspects of environmental management. It is required and guided by the Government to use these duties and powers in support of sustainable development, thus taking a more integrated and longer-term view of environmental management than its predecessors. In September 1997, it set out its objectives and priorities for achieving this approach over the next 5 to 10 years in its ***Environmental Strategy for the Millennium and Beyond.***.

The Agency also has a duty to make arrangements for carrying out research and related activities in support of its business. This Research and Development (R&D) Strategy mirrors the long-term perspective of the Environmental Strategy. It sets out - at a high level - the approach that the Agency will adopt in developing its R&D Programme and related activities, such as its working links with others involved in similar areas of research. While this long-term perspective will enable the Agency's R&D to be far-sighted, anticipating future environmental risks and addressing the drivers of environmental change, the R&D Strategy also recognises the shorter-term R&D needs of the Agency as it develops an effective operational structure.

The R&D Strategy thus covers the following:

- It describes the business context of the Agency's research duty;
- It sets out a series of business questions which provide the rationale to the Agency's R&D needs and issues;
- It outlines the "Frameworks and Themes" structure of the Agency's R&D Programme;
- It sets out the way in which the Agency will plan and manage its R&D - focusing on delivering practical results to end-users, and taking forward this Strategy .

In carrying out its R&D and related activities, the Agency will operate within the wider national and international community of Science, Engineering and Technology (SET). The Agency expects to work in partnership with, and utilise results from, other R&D players. And it will continue to disseminate the results of its R&D to external users as well as its own staff.

The R&D Strategy is written for all who commission, use and carry out the Agency's R&D - both internal and external - in order to provide a common basis for future action. It has been drawn up against the general background of the Agency's business activities and the national Foresight initiative for SET research. In essence it is based on the need for the Agency to acquire tools and techniques ("know-how") and underpinning knowledge to enable it to respond to a range of environmental management issues. The Strategy will be implemented progressively from April 1998. It will take time to implement fully, and other needs and opportunities will undoubtedly arise in the interim as the Agency's business and environmental issues develop. The Agency will therefore review this R&D Strategy in five years'

1. The Business Context of the Agency's R&D

1.1 The Environment Agency will use R&D to enable it to achieve its vision for the environment and the business objectives that support this. The Agency's vision is to achieve a better environment in England and Wales for present and future generations. The first section of this R&D

Strategy is therefore an overview of the approach set out in our Environmental Strategy which the Agency will adopt for achieving its vision.

The Agency's Environmental Strategy for the Millennium and Beyond

1.2 We have set out in our Environmental Strategy for the Millennium and Beyond how we intend to take forward an integrated approach to management of the environment, taken as a whole. In doing this, we intend to make a significant contribution towards the achievement of sustainable development. Our approach concentrates on those areas of environmental management for which we have direct or shared responsibility.

1.3 To identify the most beneficial areas in which to take action, the Agency's Environmental Strategy has established four frameworks (Figure 1) - the first for assessing the state of the environment at any one time; the second for considering the pressures that are affecting it, and the third for looking at options for taking action. The fourth enables the Agency to deliver the right responses through environmental management action to achieve a better environment.

1.4 By following the frameworks outlined in this environmental management cycle, the Agency will target its activities, and those of others with whom it works, on the issues of greatest potential risk and benefit to the environment in which it can make a difference. We will focus our action - as appropriate - at the local, national or international context. We will adopt an integrated and long-term perspective when deciding what best to do.

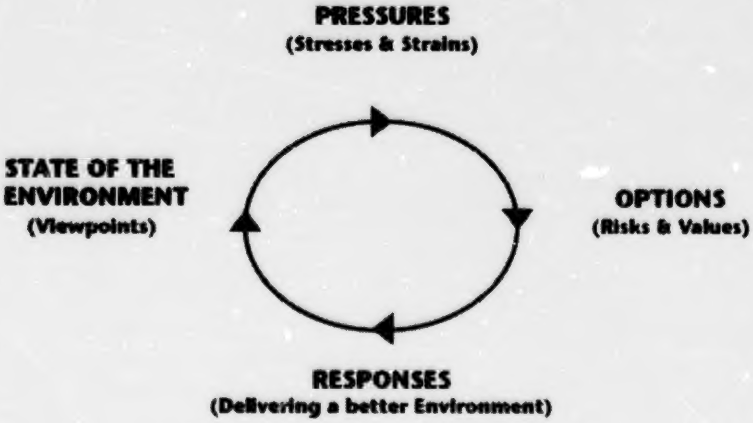

PRESSURES
(Stresses & Strains)
STATE OF THE ENVIRONMENT
(Viewpoints)
OPTIONS
(Risks & Values)
RESPONSES
(Delivering a better Environment)

Figure 1 - The Agency's four frameworks

1.5 We have reported on our initial progress in The Environment of England and Wales - A Snapshot, and are continuing to update this on our web site. We will consult widely as we develop these four frameworks - Viewpoints, Stresses & Strains, Risks & Values, and Responses.

Targeting the key themes

1.6 In our Environmental Strategy, we have identified nine key themes on which we will focus our responses:

- Addressing climate change;
- Regulating major industries;
- Improving air quality;
- Managing waste;
- Managing our water resources;
- Delivering integrated river-basin management;
- Conserving the land;
- Managing our freshwater fisheries;
- Enhancing biodiversity.

1.7 As we are adopting an integrated approach to management of the environment, these themes will be interrelated to varying degrees. We will expect to identify various cross-cutting issues, such as dealing with public perception or developing common management tools. We will prioritise and refocus the work of our internal business functions to support these strategic themes. They provide a rational way of focusing on environmental actions and represent varying resource demands on the Agency.

The role of R&D

1.8 We will use R&D to support the development and applications of the frameworks. And we will, of course, use R&D to provide the management tools, techniques or understanding needed to support our response under the key themes.

1.9 In the following strategy, Section 2 identifies the Agency's R&D needs, Section 3 explains how we intend to deliver the R&D and measure its success, and Section 4 describes how we are taking forward the R&D Programme in relation to the four frameworks and the nine key themes. The R&D Strategy thus underpins the Agency's overall approach of basing its decisions around sound science and research, recognising in particular the Govenment's guidance on the use of scientific advice in policy making.

2. Identifying the Agency's R&D Needs

A business-driven approach

2.1 This strategy focuses the Agency's R&D on its business of environmental management, and not on general environmental issues. The Agency has set down the following R&D business questions in order to develop and apply the four frameworks and to respond to the nine key themes. These questions therefore drive the Agency's R&D. They reflect both the issues which it will face, and the way in which it will need to operate.

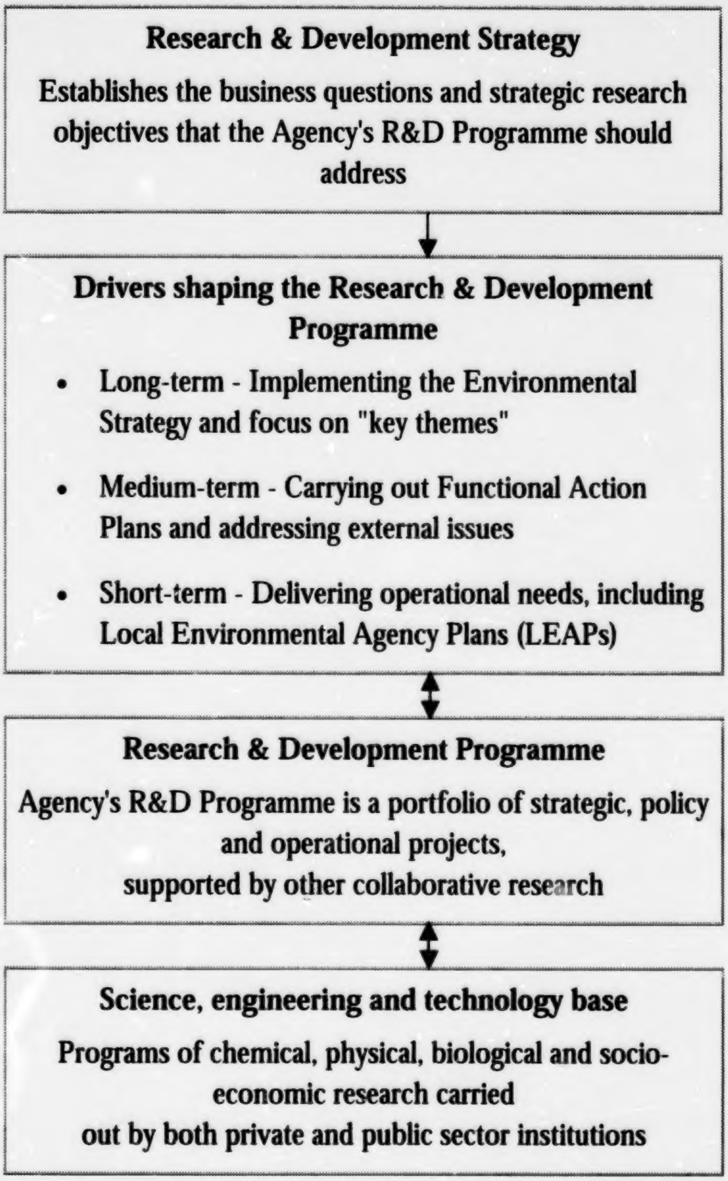
- Is the Agency able to respond effectively to external influences?
- Is the Agency able to forecast its future needs?
- Is the Agency able to maximise the returns from its own resources and efforts and, through its actions, the investment made by others in the environment?
- Is the Agency able to account for the consequences of its actions and decisions, over different time-scales and across the environment as a whole?
- Can the Agency use research to make better decisions and to act more effectively?
- Is the Agency in a position to influence other people and what they want?

2.2 Taken together, these questions span all aspects of our business and a range of time-frames - from anticipating long-term strategic issues to addressing our present policy development and operational needs. Any combination of business question and issue or need could identify a gap in available know-how or knowledge which in turn drives some R&D.

2.3 Our R&D Strategy thus seeks to manage or influence a range of R&D initiatives, which collectively support our business of providing a better environment for England and Wales. We will follow our Environmental Strategy in targeting those issues or needs that present most risk to the environment. In general, we will adopt a proactive and long-term perspective to tackling these. Our strategy both mirrors and supports the national Foresight initiative in Science, Engineering and Technology (SET) to focus on the needs for sustainable development.

2.4 However, we will not ignore either the opportunities or the need to address some immediate issues, particularly those that will enable us to develop an efficient and effective operational structure. Our Environmental Strategy gives examples of specific issues (such as endocrine disruptors) and cross-cutting issues (such as environmental modelling; public perception; and our own organisational change) which we will also need to address. Figure 2 shows the different drivers of

R&D which arise from the Agency's Corporate Planning framework (Annexe A) and how the business questions shape these into our R&D Programme.



Research & Development Strategy

Establishes the business questions and strategic research objectives that the Agency's R&D Programme should address

Drivers shaping the Research & Development Programme

- Long-term - Implementing the Environmental Strategy and focus on "key themes"
- Medium-term - Carrying out Functional Action Plans and addressing external issues
- Short-term - Delivering operational needs, including Local Environmental Agency Plans (LEAPs)

Research & Development Programme

Agency's R&D Programme is a portfolio of strategic, policy and operational projects,
supported by other collaborative research

Science, engineering and technology base

Programs of chemical, physical, biological and socio-economic research carried
out by both private and public sector institutions

Figure 2 - How different issues shape the Agency's R&D

Our strategic R&D needs

2.5 The strategic R&D needs that arise from applying these business questions to the four frameworks indicate the general issues which the Agency's R&D will need to address in delivering the nine themes. The actual R&D needs will be firmed up as the Agency's Environmental Strategy is implemented - individual projects being prioritised on the basis of risk and cost benefit. Examples of strategic R&D already underway are given in each of the Boxes.

2.6 An insert is provided with this strategy, summarising the current budget and strategic objectives of the R&D Programme and its balance between business sectors. Budget levels for the Programme will initially reflect the Agency's pre-Strategy R&D Programme and its recognised added value and benefit.

R&D needs for know-how and knowledge

2.7 The Agency's principal R&D needs will involve the development of new or improved tools and techniques ("know-how") for environmental management. We expect these needs, along with those of government, industry and others who have interests in the environment, to draw on and to drive research in the underpinning science ("knowledge") base.

2.8 Our R&D needs for know-how will include:

- Tools to measure, observe and understand the state of the environment over different scales of time and space, from point-source sensors capable of detecting ranges of chemicals in the environment to remote sensing from aircraft able to observe environmental indicators, in order to identify the occurrence of environmental change;
- Environmental modelling and assessment techniques to understand the present state of the environment and to examine the different options for managing the pressures on it - including their costs and benefits, and the consequences of societal actions and economic measures as well as approaches to pollution control and ecosystem management;

- Transfer and application of new technology into our operational activities to increase the effectiveness of front-line staff, such as decision support systems for responding to pollution incidents;
- Best practice guidance to both the Agency and others involved in management of pressures on the environment, particularly in the response of people as consumers in society (the "bottom up" element of sustainable development).

In taking an integrated approach to environmental management, we recognise that many of these R&D needs are cross-cutting - supporting all of our internal business functions.

2.9 Our research interests for underpinning knowledge from the science, engineering and technology base include:

- Understanding the basic chemical, physical and biological systems within the environment;
- Understanding how these natural systems are affected by man-induced pressures on the environment or by different management responses; and
- Developing accessible societal and economic databases to support our environmental interests

3. Delivering the R&D and Measuring Success

A business-like approach to R&D management

3.1 We recognise the importance of good planning and management of R&D in order to deliver the results to the business. Our internal Core Functions - as R&D customers - will hold the R&D budget and manage their own internal R&D programmes.

3.2 We have established a separate R&D Section under the Agency's Chief Scientist to co-ordinate and support all R&D activity. This includes the process of assessment whereby the rationale for our internal programmes is set to respond to this R&D Strategy, and the value of the R&D outputs to the business is checked..

3.3 The Agency has set down the following R&D management questions which underpin this business-like approach.

- Has the originality of the R&D been established, and other relevant work been identified?
- Is the business rationale for the Agency's involvement clearly established, and to what extent is the Agency responsible for the issue concerned? What is the risk of failure, and how should this and other risks be managed?
- Who will benefit from the output of the R&D, and is it clear how this will be implemented and used?
- How best should the R&D be carried out and managed?
- Who should pay for the R&D, and how can the Agency maximise its own value for money?
- What would happen to the environment if the R&D were not carried out?
- How is the quality and effectiveness of the R&D to be assessed?

3.4 The process of R&D planning and management is shown in Figure 3. In brief, we intend that our R&D should always build on existing knowledge and know-how ("best science" and "best practice") and that we should work, where appropriate, with other R&D players. We also aim to transfer proven technology from other sectors where possible.

3.5 We will manage and publish our R&D within recognised public-sector guidelines. This will enable our Programme to be compared and contrasted to others. This includes categorising our R&D according to the widely accepted "Frascati" definitions - the bulk of the Agency's R&D being "applied" or "developmental" work delivered to specific objectives. Also available is a Short Guide on R&D in the Environment Agency to provide further detail on the operation and management of the Programme.

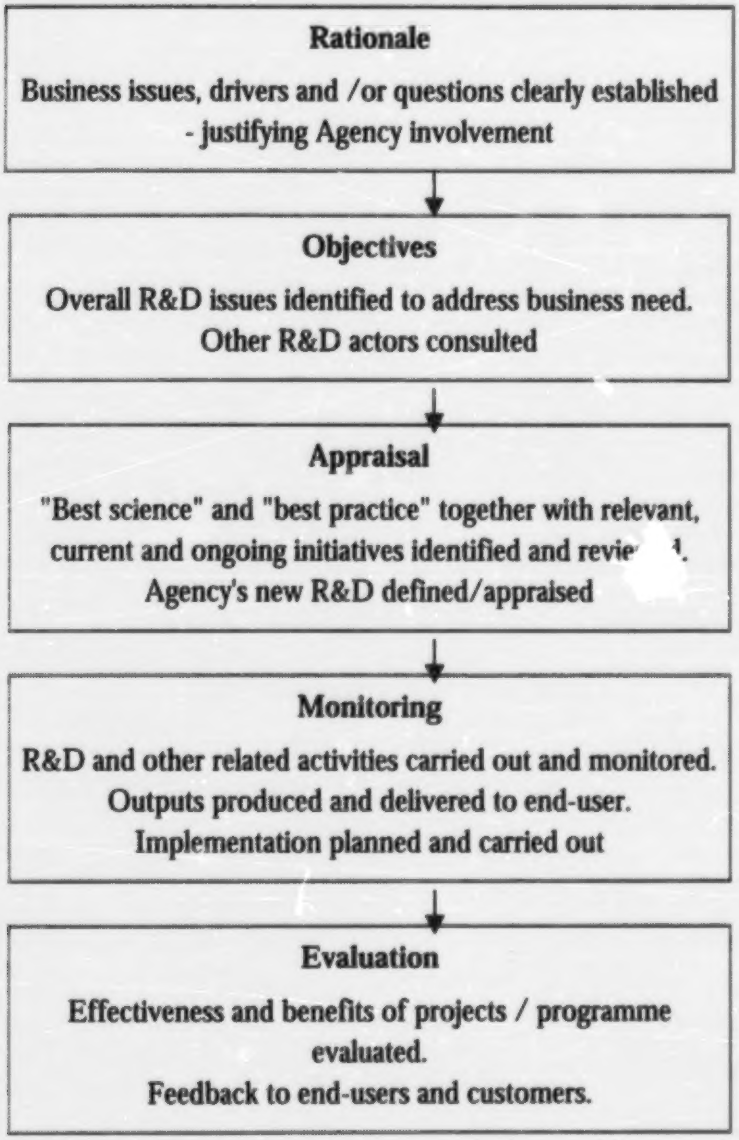
Working with other R&D players

3.6 The Agency is only one of a number of players involved in funding environmental R&D in the national, European and international arena (Annexe C). Around £180 million per annum is spent in the UK on R&D of some relevance to the Agency. Within our legal and business constraints, we will be open in co-operating and working with these other players. This will not only benefit the R&D, but will help to nurture and sustain research capability. We also recognise our role in ensuring that issues of common national or European concern are addressed. We therefore aim to:

- Work together (or collaborate, via some form of partnership agreement) with those players with whom we share common interests;
- Influence the R&D objectives and priorities of other organisations where there is benefit and justification for doing so.

3.7 Collaboration will often only apply on an ad hoc basis. However, we will establish formal R&D concordats and partnership agreements for working with the following distinct groups:

- Our parent government departments - DETR, MAFF, and the Welsh Office;
- Our fellow UK environmental regulators in Scotland and Northern Ireland;
- Our fellow non-departmental public bodies - Health & Safety Executive and English Nature;
- Key research councils contributing to the UK's SET base;
- Research organisations having unique skills and abilities of value to the Agency.



Rationale

Business issues, drivers and /or questions clearly established - justifying Agency involvement

Objectives

Overall R&D issues identified to address business need.
Other R&D actors consulted

Appraisal

"Best science" and "best practice" together with relevant, current and ongoing initiatives identified and reviewed.
Agency's new R&D defined/appraised

Monitoring

R&D and other related activities carried out and monitored.
Outputs produced and delivered to end-user.
Implementation planned and carried out

Evaluation

Effectiveness and benefits of projects / programme evaluated.
Feedback to end-users and customers.

Figure 3 - The R&D planning and management process

3.8 In our work with the research councils, we will aim to influence the broad objectives of their programmes of strategic research which contribute to the SET base and to collaborate on (including cofunding) a lesser amount of more specific research targeted at specified end-user groups.

3.9 We will contribute to the UK's Foresight initiative to help to ensure that publicly funded R&D or technology transfer support the nation's overall interests in wealth creation and quality of life. Where appropriate, we will foster partnership between industry and the public sector and we will support the development and export of UK environmental policy, goods and services.

3.10 We are also committed to active involvement in the European Commission's 5th Framework Programme for Research and Technological Development, as well as to developing common R&D interests with other EU member states. In particular, we aim to promote a range of concerted actions within the area of our key themes.

Utilising and developing knowledge and expertise

3.11 As a general rule, the Agency does not undertake research work itself. The bulk of its R&D will be contracted out to the best available external R&D contractors - procurement of R&D taking account of both cost and quality. We will publish an annual schedule of R&D projects to be contracted out. However, the Agency's National Centres will have the skills and expertise to carry out significant programmes of research in-house.

3.12 We recognise the benefits of involving our own mainstream staff in the management of R&D. They understand the context of the R&D, and will benefit from involvement with the innovation process and the external R&D community. We recognise, however, that R&D management requires special expertise, and will therefore provide specialist R&D management support to these mainstream staff.

3.13 The Agency will also seek specialist advice from the wide range of experience and expertise available through its Regional Advisory Committees and Board. Where necessary, the Agency will take scientific and technical advice from external specialists.

3.14 The Agency will explore the opportunities for exploitation of its R&D results within the context of its policy on income generation. In general it will look to other organisations - closer to the market place - to take on the risk of exploitation while seeking a realistic level of return for its investment in R&D.

Delivering and demonstrating the benefits

3.15 We will pay particular attention to planning of implementation of R&D - for example, in provision of training and demonstration - in order to achieve the benefits of R&D. Where possible, we will focus the delivery of R&D on selected locations in England and Wales in order to demonstrate how the application of its output can resolve real environmental issues.

3.16 We also aim to publicise the Agency's R&D widely, both internally within the Agency and externally. We will use current information management technology to do this. This publicity will underpin the culture of using best science and technology to support our business. We will make our R&D outputs publicly available wherever possible. Our dissemination and publicity will include:

- Annual review of R&D outputs over each past year, plus listings and summaries of all R&D outputs;
- Listing and contact information for R&D projects starting during the current year;
- A single R&D Dissemination Centre for ordering and distribution of all R&D outputs - both internally and externally;
- Articles, presentations and press releases on projects and outputs of interest; and

- Use of the Internet and internal e-mail systems to assist user access to our R&D.

3.17 We will encourage our staff, together with our partners and contractors, to publish the results of our R&D in refereed SET journals and publications wherever possible.

Evaluating the success

3.18 Finally, we will evaluate the success of our R&D on completion - not simply to check its quality and whether intended benefits have been achieved, but to feed back lessons for the future (see Figure 3). Evaluation will address targeting of the R&D, achievement of its objectives, quality and value for money, and whether the Agency is getting the anticipated benefits from it.

3.19 In line with the Government's guidelines on the Use of Scientific Advice in Policy Making, we will where appropriate expose the results of our R&D - particularly on controversial or sensitive issues - to open consultation and debate. Separately, we will select a number of projects each year for post- project evaluation by an independent specialist in order to examine their real impact on the Agency's business and on the environment.

3.20 We will also carry out a rolling series of independent "Programme Area Reviews" to examine the effectiveness of our internal R&D programmes, to report on how well our R&D is addressing the Environmental Strategy and to assist in the refocusing of priorities. We aim to subject the entire Programme to such evaluation over the five-year period.

4. Taking Forward the R&D Strategy

4.1 We will implement this Strategy within the existing mechanisms for planning, management and collaboration - both internally, within the Agency, and externally. We will consult widely in proposing any new management structures - for example, for co-ordinating key UK actions on the EU 5th Framework Programme. Because this R&D Strategy is business-driven, many of the mechanisms for taking it forward already exist within the Agency for its internal business functions.

4.2 Key steps include:

- Consultation on this draft Strategy - particularly to identify the needs and issues for which the R&D can be done by collaborating with other R&D players;
- Building new issues and needs into the R&D Programme. Much of the Agency's existing R&D Programme already addresses elements of the strategic frameworks and the key themes. We aim to refocus these into clearer key issues for implementation. The main impact of this R&D Strategy on the R&D Programme will, however, be through its influence on the issues covered by new R&D projects;
- Establishing an issue-driven structure to the Agency's R&D Programme. From 1998, we will plan and report our overall R&D Programme against the three frameworks and the nine key themes. We will also establish an overall "know-how" and "knowledge" framework for interfacing our R&D with the science base;
- Getting R&D on to the business agendas. We will seek widespread involvement with Agency groups responsible for taking forward the key themes and the Functional Action Plans - these will establish the needs and issues which drive R&D and ensure that results are implemented;
- Establishing major partnerships with other R&D players. We look to increased impact of our R&D funds through major initiatives with, for example, the research councils and key European institutes, particularly on demonstration projects and EU Concerted Actions;
- Focusing our internal expertise on scientific excellence in our National Centres and on R&D management in a National Service. Our National Centres form an important focus for linking the Agency with the wider scientific and technical community (we are

of course also committed to supporting R&D in all sectors of the Agency);

- Expert reviews to evaluate different sectors of our R&D Programme in order to bring together our own staff with key professionals and researchers in the sector concerned.

4.3 We will report on the implemention of this Strategy annually through a summary of Current R&D and our Annual Review of R&D. And, of course, we must remember that this strategy is a means to an end, not an end in itself. Above all, we must continue to check that the process is indeed delivering practical results which are contributing to a better environment.

Appendix I:

Health Canada Knowledge Management Vision & Strategy

Vision and Strategy for Knowledge Management and IM/IT for Health Canada

"Knowledge is Powerful Medicine"

– Eli Lilly (Fortune 7/95)

December 1998

Vision and Strategy for Knowledge Management (KM) and IM/IT[1] for Health Canada

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[1] IM = Information Management IT = Information Technology
All acronyms are listed in the Glossary in Appendix G.

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D - The Knowledge Management Architecture for Health Canada - Proposal
E - Integration of Health Canada's Contribution to the Canadian Health Infostructure
F - Building a Policy/Research Capacity in Health Canada
G - Glossary of Acronyms

Foreword

The Department commissioned this vision and strategy at a critical time in its evolution. As in other departments and the wider world, we are on the verge of a shift both in the way we work and the way we think about our work. This shift is a continuation of a process that has been underway for some time, the catalyst for which has largely been the adoption of information technologies such as e-mail and the Internet.

Over the years, Health Canada has made extensive investments in information technology. We have reaped and continue to reap many benefits from these investments; however, there is a sense that we have not been able to exploit their full potential. The technology for accessing and using information has changed, but our ability to use that information to support our work has not. More intensive use of information has created a corresponding awareness that it is the people who use the information, and not the information itself, who are the primary source of value. This vision and strategy consequently addresses not just information systems and technology, but also the skills, experiences, and informal connections - in short, the knowledge - of people in the health system.

People aren't used to thinking about what they know. When I commissioned this vision and strategy in September 1998, it was with the understanding that the process of developing it would be a learning process for all involved. Simply establishing the scope of the project was a significant endeavor for the participants. With this in mind, I invited senior representatives from a cross-section of our Branches and business lines to participate in a small "visionary" committee. To this committee I assigned the task of crafting a vision and strategy that could guide the Department in its thinking about how to use information and knowledge to help Canadians maintain and improve their health. The vision and strategy could then be presented to the rest of the Department as a starting point and a foundation for discussion.

This vision and strategy was tabled at the Health Information Strategy Steering Committee (HIS) on December 9, 1998. After extensive discussion, members concluded that it was ready to be brought forward to the Department as a whole for continued discussion. Members furthermore recommended that operational plans be developed to continue the momentum. This vision and strategy, in the context of the debate that I hope it inspires, will serve as a founding directional piece to bring us toward a state where we generate and use knowledge consistently and comprehensively to support business goals.

I would like to take this opportunity to thank all who took part in this project for the hard work and intellectual vigour they applied to it. The Department now has an excellent starting point from which to open the debate internally, and with our colleagues and partners, on how we can use knowledge strategically to support our mission. I invite anyone with an interest in the health system to review this document and consider its messages in light of your own work requirements, both current and anticipated.

Executive Summary

The demand by the public for faster and better access to information, and the untapped potential of the Information Highway, led Health Canada into quite a few knowledge and information initiatives by the Summer of 1998. The HIS Internal Steering Committee, chaired by Alan Nymark, commissioned the development of a vision and strategy for Knowledge Management and IM/IT in September 1998 to align the department to work in concert toward a consensus vision, tied strategically to departmental business.

A "Visionary Committee", chaired by Marie Fortier, of senior officials in the Department was established to develop a strawman vision and strategy for review by the HIS Internal Steering Committee. Members were chosen from a cross-section of Branches and business lines. The group felt that as a department "We don't know what we know"---"We don't know what we need to know"---and---"We don't know what information we have (or need), or where it is, or how to find it."

It was clear that a more strategic approach to managing knowledge and information was critical to support current and future initiatives. We cannot create knowledge helter-skelter without clear means to capture it, classify it and make it accessible.

The Committee felt that the shift in culture within the Department from a traditional, more industrial model, to one in which knowledge and innovation are valued, needs to be acknowledged by all, and supported strategically by Management to focus on common goals.

The Committee recommends that the following **vision** be adopted for the way in which we would like Health Canada to be, and be perceived, in three to five years:

Health Canada analyses, creates, shares and uses knowledge[2] strategically to maintain and improve the health of the people of Canada in the following ways: through its knowledge management processes and strategies, which are tailored to advance the business lines of the department; as a model knowledge organization; and as a leader, facilitator and partner, in the development of a Canadian health infostructure.

Health Canada defines knowledge management as a departmental strategy for ensuring that health knowledge and information are identified, captured, created, shared, analysed, used and disseminated to improve and maintain the health of Canadians. The strategy acknowledges and builds upon the need for Health Canada to assist in improving -- and to interact as a valued partner in -- the health system through influence and outreach, through world-class analysis and research products and capacity, and through connecting and empowering employees via IM and IT infrastructure, tools and services. Working within an intricate policy and legislative environment, the strategy must support departmental priorities and business lines, recognizing that in one way or another, all Branches and the department as a whole are in the health knowledge business. The strategy must also rely on and build from our professional and societal values to nurture and sustain a learning and knowledge culture.The Committee recommends that the following **principles** be adopted as the foundation upon which the strategy is built:

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[2] Health knowledge is defined to encompass information, skills, expertise and experience related to and supporting health and the health system, nationally and internationally.

Committed leadership must be exercised in valuing, analysing, creating, sharing and using knowledge.	**Health knowledge must be: analysed, created and captured wisely; easy to access; shared thoughtfully; and managed well.**

The **strategy** for building a knowledge and learning culture in Health Canada begins with building capacity, skills and tools to capture, create and share knowledge from targeted and improved health research and analysis. From a more strategic and collaborative approach to analysis and research, the demand for knowledge, information and data can be determined. Analysis and research would be shared, disseminated and communicated, for various audiences, using a variety of formats and media.

Several strategic initiatives are proposed to assist in achieving the vision:

1. **Develop a knowledge culture** including the establishment of a Chief Knowledge Officer, the creation of a capacity to improve and implement knowledge strategy (frameworks, priorities, plans), and to lead knowledge culture initiatives (communities of practice, knowledge-maps, sharing). It also recommends the establishment of knowledge business specialists who would ensure that knowledge, information and data are developed, found or acquired and that technology tools (discussion databases, intranet) are identified and built, to meet business needs.

2. **Conduct analysis and research** by creating an internal capacity (staff, analytical frameworks, methodologies, publications, reports, briefing notes, seminars, conferences), influencing the national health research agenda, and developing skills (all staff), and "absorptive" capacity.

3. **Create health infostructure** by identifying, nurturing, investing and partnering in projects, consulting stakeholders (Ministers Advisory Council on Health Infostructure, CIO Forum, etc.) and developing and influencing policy and standards (privacy, security, connectivity).

4. **Provide enterprise IM and IT services** by developing and maintaining architectures, infrastructure and tools.

If the strategy is successful, the **result** will be

- a strengthened federal role in health for Health Canada, through value-added, strategic and policy-driven information and analysis, developed by a critical mass of world-class in-house expertise,
- improved policy research-and-development products, advice and abilities,
- better and consistently improving service to Health Canada clients, and
- strong support by Health Canada to the priorities of the Clerk of the Privy Council.

The establishment of the Information, Analysis and Connectivity Branch in November 1998 demonstrates departmental commitment to this vision and strategy.

I. Vision

I.1 Narrowing the Gap Between the Status Quo and our Desired Future

Health Canada needs to strategically and aggressively narrow the gap between the status quo as described in the adjacent text box, and its desired future as follows:

The Status Quo - At Health Canada we do not

- know what our employees know,
- know what information we have,
- know what information we need,
- have a coordinated approach to the capturing of employees' knowledge, or
- have a guiding blueprint for investments in knowledge, information, applications or technology.

- knowledge is recognized as a tangible, mission-critical resource;
- knowledge management is integrated into business initiatives and processes as a means of fulfilling business requirements;
- Health Canada's Management supports and invests in knowledge initiatives which continue to build knowledge and IM/IT infrastructure, tools and services to support the department's business lines;
- Health Canada employees at all levels have fully endorsed and adopted a knowledge and learning culture;
- Health Canada is a recognized leader in the development and implementation of a Canadian health infostructure which is built on common infrastructure and standards where logical and cost-effective;
- Health Canada systematically creates knowledge and influences the conduct of research where there are knowledge gaps, shares this knowledge securely and uses new and existing knowledge effectively in taking evidence-based decisions; and
- Health Canada is a respected business partner and active participant in communities of practice, nationally and internationally.

Health Infostructure is defined as:

The application of communications and information technology in the health sector to allow the Canadian public, patients and caregivers, as well as health care providers, health managers, health policy makers and health researchers to communicate with each other, share information and make informed decisions about their own health, the health of others, and Canada's health system.

I.2 The Vision Statement

Health Canada's Mission

To help the people of Canada maintain and improve their health.

Health Canada analyses, creates, shares and uses health knowledge to maintain and improve the health of the people of Canada:

- through its knowledge management processes and strategies which are tailored to advance the business lines of the department;
- as a model knowledge organization; and
- as a leader, facilitator and partner, in the development of a Canadian health infostructure, responding to national and international trends and opportunities.

I.3 Working Definitions of Knowledge Management Terms

The term 'knowledge' is used extensively in this document and often appears in association with, and can be confused with, the terms, 'information' and 'data'. To clarify the distinction, 'knowledge' is defined as follows:

> Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provide a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers.
>
> T.H. Davenport and L. Prusak, Working Knowledge:

The two key distinctions to be made among knowledge, information and data are firstly, that knowledge exists in the mind, and secondly, that knowledge is a framework for evaluation. If, for example, a heart surgeon writes down instructions for performing a new transplant procedure on a piece of paper, the contents of the paper (i.e., information) will become knowledge when read by another heart surgeon who understands the context and how to apply it. It remains information when read by a non-surgeon who understands only the general concept of a heart transplant, and it becomes data when viewed by a person who does not speak the language in which it is written.

Working Definitions of KM Terms

Data are facts, observations, or measures that have been recorded but not put into any meaningful context. A single musical note is data.

Information is data that has been arranged in a systematic way to yield order and meaning. A series of notes arranged into a tune is information.

Knowledge is information in the mind, in a context which allows it to be transformed into action. A musician is able to play a tune because of his knowledge.

It is because knowledge is contextual that knowledge management initiatives have to be described as sets of information management / information technology (IM/IT), learning, and business initiatives. These initiatives aim to get information to the people who need it, give them the tools and freedom to analyse it and fill gaps, and give them a framework in which to apply it. The actual transformation of information into knowledge occurs at all stages in people's minds and becomes evident only in the decisions they make and the actions they take. Knowledge management, therefore, aims to create the same fluid mix of framed experience, values, contextual information, and expert insight within the organisation that exists within the individual mind, thereby providing the organisation with a framework for evaluating and incorporating new experience and information. The transformation to a knowledge management culture would consequently only become evident in the decisions the organisation makes.

The *Giga Information Group* (March 1998) has advised its clients that knowledge management will never possess the kind of crisp definition afforded its individual components. Knowledge management tends to be defined by the organization applying it and by the organization itself.

Health Canada has defined knowledge management as per the adjacent text box, to provide a common understanding of the way in which knowledge management will be applied to meet today's needs and prepare people for a future, more knowledge-based health system and society. Knowledge management will be different and applied differently in each of the business lines of Health Canada. In some cases, it is the creation and dissemination of knowledge that constitutes the business line, and in other cases the business line relies on ready access to knowledge.

Health Canada Operational Definition of Knowledge Management

A departmental strategy for ensuring that health knowledge is identified, captured, created, shared, analysed, used and disseminated to improve and maintain the health of Canadians.

Health knowledge is defined to encompass information, skills, expertise and experience related to and supporting health and the health system, nationally and internationally.

As program operations should influence knowledge management, so should knowledge management be a strength called upon in the design and delivery of the business of the department.

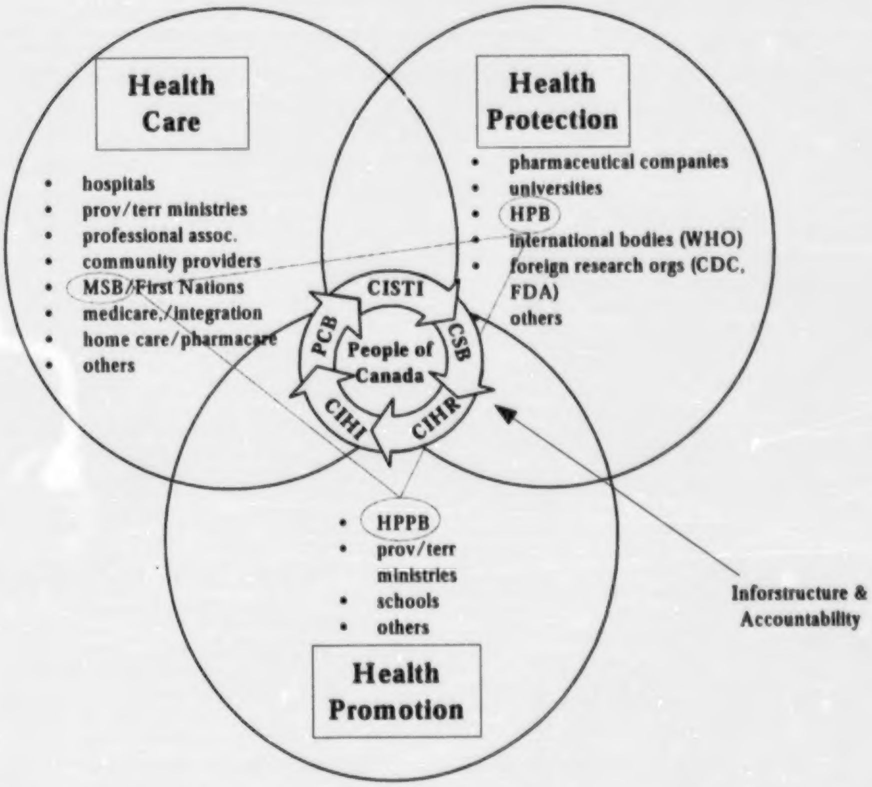
Knowledge management, with IM and IT as "enablers", should add significant value to the management of the department's business, by providing techniques for comprehensive evidence generation and assessment, more economical delivery, better service and improved efficiency.

I.4 **Rationale** - The Business Case for Knowledge Management at Health Canada

Better health decisions will be made if health knowledge is created strategically, shared effectively and managed efficiently. Health consumers can hold providers to account, and providers can better serve consumers, when knowledge provides the evidence base for health decisions. Strategic investments in knowledge and commitment to knowledge culture, then, are instrumental in maintaining and improving the health of Canadians.

Health Canada is prepared to provide leadership in the development of a national health infostructure, building on existing and future Canadian and international infostructures, to strengthen the ability of people to make informed choices about their own health, the health of others and Canada's health system (as per the following graphic).

Participants in the Health System


Health Care
hospitals
prov/terr ministries
professional assoc.
community providers
MSB/First Nations
medicare/integration
home care/pharmacare
others
Health Protection
pharmaceutical companies
universities
HPB
international bodies (WHO)
foreign research orgs (CDC, FDA)
others
CISTI
PCB
CSB
People of Canada
CIHI
CIHR
HPPB
prov/terr ministries
schools
others
Health Promotion
Inforstructure & Accountability

Health Canada recognizes the central role of knowledge in improving the health system, and is committed to investing in learnnig and development, IM and IT to build and maintani a business-driven knowledge mangement infrastructure, tools and services.

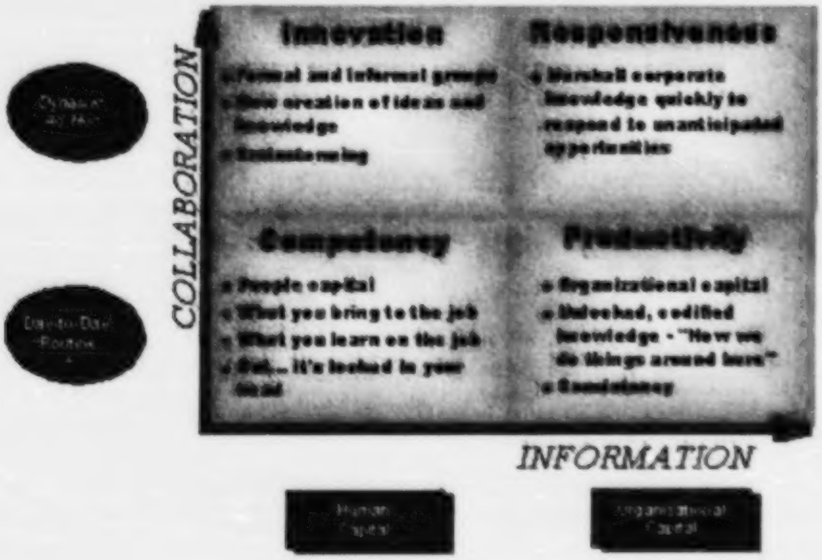
Health Canada's Strategic Learning and Development Policy - The Foreword

The world is moving into a "knowledge economy" where the performance of organizations will depend more and more on the acquisition, sharing and application of knowledge. This is why Health Canada considers Learning and Development activities, aimed at enhancing knowledge and skills, to be a priority and an essential business investment that contribute to the attainment of departmental objectives and of employee career goals. It is through the development of knowledge that Health Canada can achieve enhanced service to the public and greater organizational performance.

Health Canada recognizes the central role of knowledge in improving the health system, and is committed to investing in learning and development, IM, and IT to build and maintain business-driven knowledge management infrastructure, tools and services.

This commitment is consistent with the three priorities of the Clerk of the Privy Council: to strengthen policy capacity (in our case, by creating, sharing and using health knowledge strategically and across departments); to modernize service delivery (by developing a national health infostructure); and to build a vibrant national Public Service adapted to future needs (by developing health knowledge workers).

The Impact of Using Knowledge Collaboratively


Dynamic Ad Hoc
Day-to-Day Routine
COLLABORATION
Innovation
Formal and informal groups
New creation of ideas and knowledge
Brainstorming
Responsiveness
Marshall corporate knowledge quickly to respond to unanticipated opportunities
Competency
People capital
What you bring to the job
What you learn on the job
But... it's locked in your head
Productivity
Organizational capital
Unlocked, codified knowledge - "How we do things around here"
Consistency
INFORMATION
Human Capital
Organizational Capital

II.The Knowledge Environment at Health Canada

II.1 Both Enterprise- and Health System-Views – "We are but one player"

The Health System-View *(Our Facilitative Role)*

Knowledge management begins with a strategic approach to the creation of knowledge, usually by assessing gaps between the supply of, and demand for information in a given health information domain. Health Canada cannot alone assess critical health information gaps. Nor can Health Canada work alone in the conduct of its business. Health Canada is one part of a much larger national health system, which itself is part of a much larger international health system. Any approach that Health Canada adopts for knowledge management, then, must align the department with partners in the health system, while at the same time creating and managing knowledge that allows it to be an effectively functioning contributor to the health system.

In the initiative to create a Canadian health infostructure, Health Canada is one player among many representing provinces and territories, health professions, academia, health organizations, First Nations, the private sector, the general public and the rest of the federal government. The approach to knowledge management must assist the department to fulfill its role in the national health infostructure, which will empower the public, strengthen and integrate health services and create the information resources for accountability and continuous feedback on factors affecting the health of Canadians.

The Enterprise-View *(Our Operational Role)*

The approach to knowledge management must assist the department in meeting the commitments laid out in its Business Plan, in delivering on all of the legislative and operational requirements of the department's business lines and in ensuring that knowledge improves the department's ability to establish and meet these obligations in the future.

Is there a difference?

The enterprise-view focuses on resources within the department; whereas, the health system-view may deploy resources into the health system, outside the department. The enterprise-view ensures interoperability within the department and, as one node on a larger national health web, seamless communication with health partners. The health system-view promotes common standards, national strategies for privacy and security and investments in information and technology infrastructure. The department too needs common standards to minimize costs of information and technology, common strategies for privacy and security and timely investments in information and technology. In both views, the department must show leadership in bringing together people, information and technology to create, capture and use health knowledge.

II.2 Culture and Values

Health Canada is committed to maintaining and improving the health of Canadians. The values that are reflected in this commitment are honesty, integrity, trust, responsibility, transparency, hard work, teamwork, innovation, cooperation, fairness, dignity and respect. At the same time, employees of Health Canada have very strong allegiances to the health constituencies they serve and to own organizations within the department. As a result, there is a need to overcome organizational boundaries when they become an impediment to sharing knowledge. We should, therefore, build on our strengths and model our knowledge culture on our values.

The accuracy, completeness and value of knowledge in the organization are completely dependent upon the full and informed participation of all employees. Departmental business and functional line managers and employees are key partners in operationalising the knowledge management vision for the department. To fully exploit existing information, create it where required and share it with colleagues across traditional barriers, a cultural shift is required in the department. Managers must lead by example, demonstrating this shift by both words and action.

Recently Health Canada has been subject to much public scrutiny. Commitment to capturing the knowledge that is used in decision-making processes will place the department in a position to explain responsibly why decisions were taken, given the environment, context and information known and available at the time. The 1998 internal audit of Health Canada's record keeping practices suggests that there is much work to do to better manage records, let alone information or knowledge. The adoption of a record keeping culture is a part of the necessary cultural shift.

There are changes taking place in Health Canada, leading to an environment that is now ready both for a concerted approach to knowledge management and to foster the knowledge culture. We have the values, we need to nurture and sustain the culture.

Management styles are beginning to shift at Health Canada, as they are in the rest of government and the private sector, toward those of a knowledge culture (see table on following page):

Evolving Management Styles at Health Canada

Management Domain	**From: Traditional / Industrial (Financial Capital)**	**To: Knowledge / Innovation (Human Capital)**
Basis of Power	– information holding	– information sharing
Basis of Authority	– jurisdiction	– accountability
Performance Measures	– financial – static – $ as assets – counting inputs	– comprehensive – dynamic – relationships as assets – assessing outputs, outcomes
Structure / Culture	– hierarchical – competitive – market-share – borders and boundaries – inward focus – reporting on training taken	– horizontal – collaborative – sets of alliances – value-adding – outward focus – learning organization
People / Leadership	– cost / expense – profitability – train for new tasks – enterprise-view	– revenue / investment – sustained growth – continuous learning – enterprise- and health system-view
Process	– independence – segregated, discrete – opinion-based recommendations	– interdependence – integrated, holistic – evidence-based analysis
Information	– boxing paper records until the warehouses are full – small library acquisition budgets – paper drug approvals with scattered process trails	– creating good paper and electronic records, classifying them for easy retrieval, retaining those with operational value, safeguarding those with historical and archival value – strategic approach to the creation and acquisition of needed information – electronic drug approvals, with links to all related information
Technology	– firewalls to exclude outsiders – information processing – warehousing	– firewalls to welcome trusted partners – knowledge creation and management – using and sharing; flows, processes

II.3 Departmental Priorities

The Health Canada Business Plan for 1998-99 to 2000-01 indicates that one of three challenges for this time frame is "to enhance the quality and availability of health information and knowledge for decision-making". All of the business plan priorities require improved knowledge creation and management. Priority 5 of 6 is, in fact, to "Enhance the Availability of Health Information and Knowledge for Decision-Making".

The department is recognizing that health knowledge is a public good held in the hands of the few, but required by many. The people of Canada deal with this imbalance by relying on "the few", the health providers, to interpret this complex knowledge, and make recommendations on their health. Traditionally governments have been involved in the health system to improve and maintain health through prevention, promotion, cure and care. Each of these areas relies strongly on knowledge and information. This, plus the growing demand by the public for information on their own health, has led government into health information infrastructure to rectify the imbalance, and empower Canadians to make better decisions regarding their own health.

Improving health information aggressively and strategically is not only a new and very important priority for Health Canada, but also integral to supporting the government-wide priorities of transparency and accountability.

II.4 Legislative and Policy Environment - Overview

The legislation upon which Health Canada is founded is the *Department of Health Act*. This Act defines a number of roles and responsibilities for the department, ranging from promoting the well-being of Canadians to protecting Canadians against diseases to establishing safety standards for consumer products. Similar health legislation exists in provinces, other countries, and other jurisdictions, and these contribute to the overall environment in which the department operates.

The department is also responsible for adhering to various cross-governmental policies and legislation which govern the accessibility, use and management of government information, such as the *Access to Information Act*, the *Privacy Act*, the *National Archives Act*, and the “Management of Government Information Holdings” policy. Other cross governmental policies, such as the Federal Identity Program and the *Official Languages Act*, govern the provision of information and knowledge to employees and the public.

Given that it will encompass both the department's business and its information, a knowledge management strategy can serve as a bridge between the legislation governing Health Canada's role and the legislation governing the management of its information. See Appendix B for an expanded description of the policy and legislative environment.

III. Principles

The vision comprises five defined principles:

III.1 Committed leadership must be exercised in valuing, analysing, creating, sharing, using and investing in knowledge.
III.2 Health knowledge must be analysed, created, and captured wisely.
III.3 Health knowledge must be easy to access.
III.4 Health knowledge must be shared thoughtfully.
III.5 Health knowledge must be managed well.

These principles capture the ways in which health knowledge is treated in business processes. Each business line treats knowledge somewhat differently. See Appendix C for an example (provided by the Pest Management Regulatory Agency) of knowledge being used to protect the health of Canadians.

1. Committed leadership must be exercised in valuing, analysing, creating, sharing, using and investing in knowledge.

Health Canada will demonstrate leadership by valuing, analysing, creating, sharing, using and investing in health knowledge to improve and maintain the health of Canadians.

Common sense and business case discipline will be exercised in determining how much information to create, how much to share, and how much to make readily accessible. Knowledge management will be tailored to each business line, according to its need, and not become an end in itself. Efficiency and effectiveness considerations will provide the basis for making investments in the public good. Strategic alliances with health partners will be formed where knowledge, expertise and experience can be shared to maintain and improve the health of Canadians.

Management will provide a framework within which employees can develop new and innovate ways to provide service, and will work with employees to create an environment that encourages appropriate risk-taking. Management will be prepared to accept the consequences of flexibility and reasonable risk-taking.

Knowledge management will be integrated with business processes to ensure that the right information is applied at the right time, and that products are comprehensive and logically linked to decisions, processes, inputs, functions and business lines. Strategic and operational outputs will emerge from logically redesigned knowledge-driven business processes. Otherwise, one risks "paving the cow path".

The knowledge, expertise and experience of employees and health partners will be respected and valued. Innovations will be fostered and used, and intelligent entrepreneurship will be celebrated. Employees will be provided with opportunities to share their knowledge. A learning culture will be fostered, to facilitate the development of new knowledge, the acquisition of new skills and the sharing of this knowledge and skills with others.

2. Health knowledge must be analysed, created, and captured wisely.

Health knowledge will be analysed comprehensively and health decisions will be made on the basis of analysis. The field of health analysis will be developed and treated as a discipline. Gaps in knowledge that emerge in the course of analysis will be identified and measures taken to ensure they are resolved. Research will be planned in a coordinated fashion and conducted to fill identified knowledge gaps and otherwise create the analytical base for informed decisions. Information will be created to promote transparency and accountability for health strategies and expenditures.

3. Health knowledge must be easy to access.

Existing and new information will be structured for easy access and exchange using fully integrated business and technical protocols. Existing knowledge will be identified, located, and otherwise made explicit to the organisation using knowledge maps. Knowledge maps will furthermore identify who is accountable for what knowledge.

4. Health knowledge must be shared thoughtfully.

Knowledge will be actively documented, shared and re-used where better health decisions could result, not only as a clear business need, but as a performance expectation. Existing knowledge sharing networks will be recognised and supported. Official Languages legislation and Communications policies will be observed, and common definitions used wherever possible.

5. Health knowledge must be managed well.

Knowledge will be managed well to help fulfil the department's mission. Managers will understand that responsibility for knowledge management belongs to them and will know how to integrate knowledge management practices into their work. Organisational roles will be defined to ensure that managers and employees are provided with the support they need to manage knowledge well.

IV. Strategies and Strategic Initiatives

The following strategies, each with a complement of strategic initiatives are proposed to address the principles listed above. Strategies focus on both the health system view and the enterprise view, as described in II.1 above. They are summarized below and then described in detail on the following pages.

IV.1 Exercise committed leadership in valuing, analysing, creating, sharing, using and investing in knowledge.

1.1 Establish a Chief Knowledge Officer, accountable for the knowledge management function.
1.2 Establish a framework for knowledge management.
1.3 Support knowledge management initiatives proactively.
1.4 Invest in a sustainable and modular health infostructure.
1.5 Value the knowledge, expertise and experience of health workers.
1.6 Evaluate progress in adoption of knowledge management culture.

IV.2 Create an integrated analytical and decision-making capacity.

2.1 Create a culture in which decisions are founded on evidence-based analysis.
2.2 Improve the department's capacity to analyse health system performance and outcomes.
2.3 Create an integrated analysis and research function in the department.

IV.3 Make health knowledge easy to access.

3.1 Create knowledge maps.
3.2 Create and enhance data and information models.
3.3 Adopt tools and protocols for sharing information electronically.
3.4 Remove barriers to access.

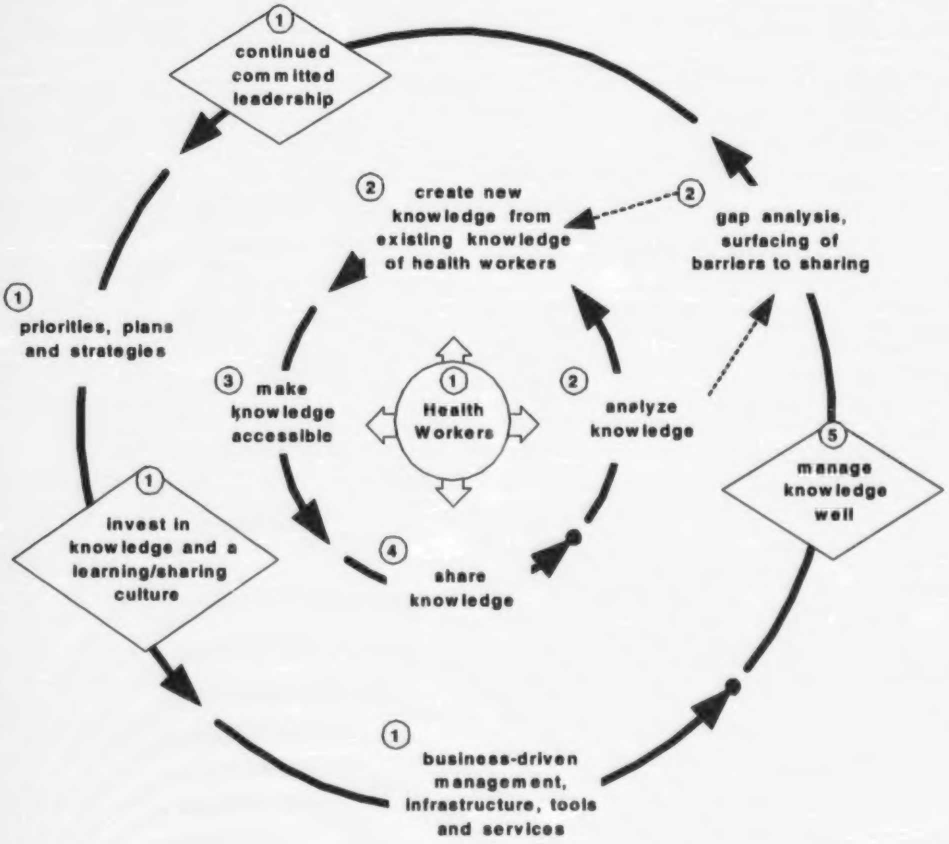
IV.4 Share health knowledge thoughtfully.

4.1 Encourage the formal and informal identification of and support to communities of practice.
4.2 Facilitate sharing proactively.
4.3 Communicate health knowledge effectively and efficiently.

IV.5 Manage health knowledge well.

5.1 Establish knowledge business specialists.
5.2 Manage records through their life cycle.

The purpose of these strategies is to build the infrastructure required to support and enhance the knowledge management life cycle (KMLC), which is illustrated in the graphic below. Note that in the graphic, the circled number next to each component of the life cycle indicates which of the numbered strategies would most support and enhance it.


①
continued committed leadership
②
create new knowledge from existing knowledge of health workers
②
gap analysis, surfacing of barriers to sharing
①
priorities, plans and strategies
③ make knowledge accessible
①
Health Workers
②
analyze knowledge
⑤
manage knowledge well
①
invest in knowledge and a learning/sharing culture
④
share knowledge
①
business-driven management, infrastructure, tools and services

IV.1 Exercise committed leadership in valuing, analysing, creating, sharing, using and investing in knowledge.

1.1 Establish a Chief Knowledge Officer, accountable for the knowledge management function.
1.2 Establish a framework for knowledge management.
1.3 Support knowledge management initiatives proactively.
1.4 Invest in a sustainable and modular health infostructure.
1.5 Value the knowledge, expertise and experience of health workers.
1.6 Evaluate progress in adoption of knowledge management culture.

1.1 Establish a Chief Knowledge Officer (CKO), accountable for the knowledge management function.

The CKO would guide the evolution of knowledge management in Health Canada and act as the knowledge business specialist (see Strategy 6.1) for the whole department. The CKO would coordinate the integration of knowledge management into existing frameworks and initiatives in the health system, function as a source of expertise on the frameworks and initiatives that relate to knowledge management, and flag potential knowledge management initiatives or barriers to knowledge management in the health system. The CKO would represent Health Canada on national initiatives such as the Canadian Institute for Health Information (CIHI) or the Canadian Institutes of Health Research (CIHR), and/or coordinate between the departmental representatives. The CKO would also be responsible for leading the cultural change.

1.2 Establish a framework for knowledge management.

A framework to facilitate responsible management of knowledge-related assets (people, knowledge, information, software, hardware) and the provision of knowledge-related services (knowledge, information, applications and technology), through good governance (policies, standards, guidelines and consensus-seeking committees) and good planning (strategic, investment, project, operational).

The Knowledge Management Architecture

1. Governance and Planning	(Managing)
2. Knowledge and Information	(Informing)
3. Applications & Technology	(Applying Technology)

A Knowledge Management Architecture (KMA) for the department (see proposed structure in Appendix D) is proposed as per the text box above. It would assist the department in determining how it wishes to invest in and manage knowledge assets. The information management subcommittee of the departmental executive committee, the DEC-IM, requested the development of an IM/IT architecture to complement a good vision and strategy for IM and IT, at its March 1998 meeting. The KMA would respond to this request and augment it with a knowledge and knowledge management optic. It would also situate better the role of the CKO, and assist in refocusing the IM/IT governance structure in a knowledge environment. The KMA would support employees at all levels by providing the tools necessary to use knowledge to help Canadians maintain and improve their health.

We must integrate knowledge management into existing frameworks for IM/IT and human resources planning, business planning, health system renewal, learning and development, and others. Planners are finding it difficult to integrate new knowledge management approaches into changing business processes, especially given the lack of vision, strategy and frameworks. One example of an approach to integration, in the light of such complexity is provided in Appendix E. It is the approach proposed for integrating Health Canada's contribution within the overall Canadian health infostructure, but it is also applicable more generally to knowledge management.

1.3 Support knowledge management initiatives proactively.

Comments on the Health Infostructure and Health Canada Challenges by the Deputy Minister and the Associate Deputy Minister to "Wrap-up" the September 1998 Management Council

- we do live in a networked world
- this is quite a change for the public and for the public service in general; the job ahead of us is ambitious
- all staff should be involved and engaged
- all staff should be provided with an opportunity to review and respond to the recommendations in the Interim Report of the Minister's Advisory Council
- it does and should mean empowerment; the generation of new ideas is important; if we do not try new things we do not make progress
- we will stand behind you if you fail trying something new
- recognize the innovations and achievements of your staff
- think positive, think service, but above all, think

The proactive creation and use of knowledge should be promoted, valued and acknowledged. The department should seek out and support knowledge sharing initiatives whose aim is to improve and maintain the health of Canadians, both those that arise internally and those that arise from interactions with partners.

Management should participate visibly in initiatives and fora which seek to advance the state-of-the-art and the state-of-the-practice. Everyone should lead by example, regardless of position in the organization, to demonstrate the added value from creating, sharing and using knowledge innovatively and from collaborating with colleagues and partners.

Management should explain the benefits of knowledge management to new employees and seek ways to incorporate knowledge management meaningfully into their work. Management should identify and remove barriers to the creation, use and sharing of knowledge.

1.4 Invest in a sustainable and modular health infostructure.

For the health infostructure initiative to succeed, targeted, strategic investments are required, but which ones first? and with what scope? Potential initiatives include:

- provincial and territorial systems that encourage patient oriented systems and accountability (data collection and reporting) systems at the local level
- the continued development of privacy standards that reflect the concerns and priorities of Canadians
- the development of national "networks of networks" among key stakeholders, such as voluntary sector organisations, First Nations, community health centres, and medical libraries
- the development, spearheaded by CANARIE, of a very high bandwidth optical network and the corresponding development of broadband applications that could be applied to a health context, for example, satellite linkages for remote areas
- -the creation of large scale applications in priority areas such as "telehealth", home care, pharmacare, and waiting lists

The department should continue to support the work of the Minister's Advisory Council on Health Infostructure by leading the federal government's contribution to the establishment of a nation-wide health information system. This must be done in conjunction with internal and external partners, to enhance evidence-based decision-making and accountability for health expenditures.

By improving availability and accessibility to health-related information, a health infostructure can help provide more accurate intelligence on the effectiveness of the system and its strengths and weaknesses. An infostructure allows greater integration across the continuum of care, encompassing promotion and prevention, and the various kinds of direct health care. As such, an infostructure enables knowledge management across the entire health system. The Office of Health and the Information Highway (OHIH) is already sponsoring initiatives in this area, the Canadian Health Infostructure (CHI) projects among them.

To develop Health Canada's position on, and coordinate the department's contribution to, the textboxed and other potential initiatives, there is a need to develop a capacity within Health Canada to identify new ideas and proposals for knowledge management projects, define them, incubate them to the point that their viability can be assessed, and rank them according to the priorities set by the department in its strategic health information plan (see IV.2.2).

It is proposed that a Knowledge Innovation and Investment Office (KIIO) be established to develop this departmental position. It is further proposed that a committee be established, (or an existing one be used) to review and choose initiatives to pursue or support. Examples of projects for such consideration would be:

- the concept of creating a national health library for Canada, a network of health libraries and their networks;
- the integration of departmental data models with CIHI's national health data model; and
- the many sub-projects and application ideas that make up the CANARIE initiative for creating a broadband optical network.

In addition to incubating new initiatives, the Office would look ahead several years to determine which technologies are emerging globally, identify those which could be used to improve the department's delivery on its business priorities, and propose projects accordingly.

The Office would recognize, promote and communicate knowledge initiatives.

1.5 Value the knowledge, expertise and experience of health workers [3].

Explain the benefits of proactive creation and use of knowledge, based on the expertise and experience of health workers:

- promote knowledge management success stories;
- focus groups of employees should be held to establish grassroots ideas on ways to establish knowledge and learning culture;
- learning initiatives should be further upgraded to include knowledge management content; and
- a 'dog and pony' show on knowledge management should be developed.

Knowledge culture is one in which knowledge is treated as a valued resource and applied strategically to meet business needs.

Continuous learning culture is one in which employees have ready access to learning opportunities which prepare them for the challenges of meeting current and future business needs.

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[3] Health workers are employees of Health Canada dedicated to improving and maintaining the health of the people of Canada. On a broader level, health workers are composed of the myriad of people involved in health care and are actively at play in the health system across Canada. They are researchers, health economist, social marketers, social worker, inspector, scientists, chemical or bioengineers, nurses, dentists, pharmacists, hospital administrators, physicians, etc. who contribute or have contributed in some way to public health.

- Seek out opportunities to transform individual knowledge into organisational or health-system knowledge.
- Encourage innovations which lead to the creation, sharing or use of knowledge.
- Promote the adoption of procedures and tools which allow health workers to document (i.e., codify), and thereby share, their domains of expertise, knowledge and experience.

1.6 Evaluate progress in adoption of knowledge management culture.

Progress toward effective use of knowledge in business processes should be evaluated through the performance appraisal process, through monitoring take-up on knowledge-related initiatives, and through assessments of the impact of these initiatives on the business line.

IV.2 Create an integrated analytical and decision-making capacity.

2.1 Create a culture in which decisions are founded on evidence-based analysis.
2.2 Improve the department's capacity to analyse health system performance and outcomes.
2.3 Create an integrated analysis and research function in the department.

2.1 Create a culture in which decisions are founded on evidence-based analysis.

Create a culture in which research and knowledge development activities are translated into informed policy decisions. Build links between the health policy development function, the health research function, and the IM/IT and human resource development functions.

Under the direction of the departmental executive committee, assess the current alignment and disposition of these functions in the department for the purpose of:

- identifying the types of research that are needed for policy development
- determining what conditions will support "policy relevant" research
- exploring the connections between research and policy that are needed to ensure that research is relevant and useful to the policy development process
- identifying the IM/IT and human resource frameworks and architectures that will support research and policy development

Develop plans for the integration and alignment of the policy and research functions at the departmental level (see Appendix F for an overview of a proposal for building a policy/research capacity in Health Canada). Continue to support the evolution of health research in Canada as a whole from the capacity building stage, where the focus is on making targeted grants, toward a fully networked, integrated stage in which research results are operationalised in clinical practice.

As part of the process of evolution, create mechanisms for filling knowledge gaps as they become apparent. The process can be focussed either internally or externally.

Internally, develop strategic information plans for filling knowledge gaps within the department, whether by:

- improving access to data and information as outlined in section IV.3;
- sharing knowledge as outlined in section IV.4; or
- managing knowledge better, as outlined in section IV.5.

Externally, create a capacity for developing the Health Canada position on the setting of health research priorities, and for representing these with the major research institutions and granting agencies (IV.2.1). By taking a coordinated, departmental approach toward the setting of research agendas, this entity will help target health research more effectively to build capacity in the health system.

The department will improve its own capacity in this regard, and the capacity of the health system as a whole, by participating actively in and serving as a link between, the initiatives described below:

- the department's Fall Strategy to improve accountability for health expenditures and outcomes by creating new health knowledge on the long term impacts of health care interventions and on the management and cost-effectiveness of the health sector, and by supporting better health policy formulation and analysis.
- the Health Information Needs Project, a collaborative initiative between the Canadian Institute for Health Information, Statistics Canada and Health Canada. This Project is tackling the current inability to capture data pertaining to health outcomes, appropriateness of services and overall system efficiency and effectiveness.

Priorities of the Health Information Needs Project

- building capacity at the provincial, regional and community level for information use and evidence-based decision-making
- distributing information on health to consumers
- decreasing cycle times, be it in terms of policy development, analysis and reporting
- improving quality of health system performance based on comparability of outcomes at all governance and population levels
- increasing system efficiency and affordability

- the Policy Research Initiative, which was founded in July 1996 by the Clerk of the Privy Council and tasked with examining the pressure points Canadian society is likely to experience in next ten years, identifying gaps in our knowledge, creating a research plan to fill the gaps, and working horizontally.

Policy Research Initiative (PRI)

Draft Interim Report (October 1996) (p.356)

An important function of policy research must be the transformation of leading-edge theoretical and empirical research into recommendations for pragmatic policy initiatives. In that respect it is crucial that the research function cement close ties with the policy development functions. In practice, however, this means there needs to be a forum to consider and discuss the results of research work.

- the Canadian Population Health Initiative, formerly the National Population Health Institute, which was proposed by the National Forum on Health and given the mandate to aggregate and analyse data, develop data standards and common definitions, report to the public on national overall health status and health system performance and act as a resource for the development and evaluation of public policy.

- the Medical Research Council (MRC) and its proposal for Canadian Institutes of Health Research (CIHR), which are to foster a cross-country network of research centres that share knowledge and help set national health research priorities. The CIHR aims in the long term to develop a 'centres of excellence' approach to health research, in which similar projects emerging from different jurisdictions are linked around a theme.

MRC Presentation to Ottawa Life Sciences Council, 23/10/98: CIHR Targeted Outcomes:

- 1000 new grants
- doubling size of each grant [to internationally competitive levels]
- 10% of world biotechnology market
- boost translational research
- anticipation, prevention of health care crises
- 50,000 new jobs

- the federal granting agencies for health research, including:
    - the National Health Research Development program (NHRDP), which is Health Canada's program for supporting extramural Canadian health research and researchers
    - the Canadian Health Services Research Foundation (CHSRF), which facilitates the production, dissemination and uptake of research for evidence-based decision-making in the management, organization and delivery arrangements to health services
    - The Social Sciences and Humanities Research Council (SSHRC), which is Canada's federal funding agency for university-based research and graduate training in the social sciences and humanities.
- the Science Advisory Board, which reviews the scientific, technical and policy aspects of HPB programs. The Board uses knowledge to determine whether HPB's science and technology base is adequate for meeting its business requirements and to identify areas where improvements could be made.

Scope and Purpose of the Science Advisory Board
(excerpt from Terms of Reference)

- recommending, as appropriate, new or revised criteria or standards for setting priorities for public health issues and programs;
- reviewing and advising on new information needs and on future human resource needs for scientific and technical programs;
- providing advice on partnerships and strategic linkages with local, regional and international agencies....; and
- reviewing and advising on scientific and technological trends in a global context and the issues and opportunities that are driving this change.

2.2 Improve the department's capacity to analyse health system performance and outcomes.

Support the development of health analysis as a discipline. Support the creation of a body of theories, techniques, and tools for analysing health system performance. Establish meaningful measurements and metrics, comparable to those used in economics or sociology, with which to evaluate the health system, assess the outcomes of decisions on the health of Canadians, and set long term performance goals. Establish standards for ensuring the integrity and quality of the evidence generated through analysis. Establish protocols for packaging and disseminating the evidence generated by analysis.

To create these competencies, the department will:

- identify, support, and sponsor formal and informal communities of practice in the field of health analysis (see IV.4.1);
- in the context of communities of practice, implement practices and procedures that will encourage the identification, development, and documentation of techniques of applied health analysis;
- invest resources in developing the skills of existing analysts and recruiting new analysts, for example, by means of a university recruitment campaign;
- participate actively in cross departmental, national, and international initiatives that make extensive use of health analysis (see IV.2.1 for examples), and sponsor the creation of modules within one or several of those initiatives specifically devoted to the formulation of analytical techniques;
- improve the overall capacity of departmental employees to conduct, use, and understand analysis;
- raise the profile of health analysis in the department as a whole by encouraging key staff to pursue innovative approaches to using analysis to resolve health questions, whether through public opinion polling, collection of administrative health information, intensive statistical analysis, or other means.

2.3 Create an integrated analysis and research function in the department.

Create a cadre or critical mass of subject matter experts in the department who are capable of conducting in-house health analysis and research and absorbing externally produced analysis and research. Build this cadre's capacity to package and disseminate the evidence thus generated for programs and clients to use in making decisions. Clearly define this cadre's role in the department with respect to the programs.

The function will:

- identify and establish analytical methodologies and best practices by such means as adapting and adopting internally and externally developed analytical techniques;

The Health Canada Strategy for Introducing Knowledge Culture

Invest in staff to improve analytical skills.

Conduct good analysis to support recommendations.

Determine the information and data required to support analysis.

- identify and analyse health system problems and issues and make recommendations, both independently and in support of program requests;
- develop the Health Canada position on the setting of health research priorities, and represent these with the major research institutions and granting agencies;
- identify gaps in knowledge in the department and the health system;
- establish long range plans and directions for knowledge management.

IV.3 Make health knowledge easy to access.

3.1 Create knowledge maps.
3.2 Create and enhance data and information models.
3.3 Adopt tools and protocols for sharing information electronically.
3.4 Remove barriers to access.

3.1 Create knowledge maps.

Establish criteria for assessing which types of knowledge should be identified. Identify key knowledge centres in the department and the health system and poll them to ascertain their respective knowledge bases. Publish this information in the form of a knowledge map which all participants can use as a reference. Establish protocols for maintaining and validating this information.

"Knowledge Sharing via Intranet", Information Week, Oct. 5, 1998

"[Becton Dickinson & Co. employee Roberta] Smigel sold the idea of creating a knowledge-sharing application that captures the combined wisdom of the company's 19,000 employees. One example is a technical database of best practices. This database is populated by information written by employees and serves as a contact resource and corporate technical encyclopaedia. Using the database of expertise, anyone in the company can find an in-house expert in plastic injection moulding in a few keystrokes. Likewise information on clinical microbiology, another core competency of the company, is readily available online... until the advent of an intranet, employees had no systemic way to share knowledge among departments..."

Begin by creating an employee directory, which is a list of all employees, along with their addresses, telephone and fax numbers, e-mail addresses, cell phone numbers, in addition to job title, duties and organization, academic training, skills, experiences, expertise, publications, areas of interest, community and volunteer work, etc. If useful, the concept could be expanded to outside of Health Canada. This type of directory is one of the first tools developed in companies adopting knowledge management. It is the "people roadmap". There are existing tools to build on (e.g., Corporate Services Branch's Directory, Policy and Consultation Branch's Lotus Notes database of non-governmental organizations). Knowledge maps like this assist communities of practice in establishing themselves, as they make common areas of responsibility or expertise visible and thereby encourage sharing.

3.2 Create and enhance data and information models.

Create models with which to structure health data and information.

In the case of health information, continue to refine and expand the Health Canada Business Model. Promote the business model as a tool for structuring all departmental information regardless of format and business line. Continue to incorporate the business model into records management processes and the organisation of the departmental website.

National Health Data Model

The Canadian Institute for Health Information (CIHI) is leading the development of a national health data model which would serve as the umbrella for all health data models in Canada. The project, which was initiated in October 1997, involves representatives from Health Canada as well as the Ministries of Health for British Columbia, Alberta, and Ontario. At a recent data modelling session, representatives from the provinces and every branch in Health Canada, including care providers, researchers, and surveillance people, achieved concord on what the basic data elements were and how they related to each other within the health system.

In the case of health data, continue to support and participate in the CIHI Information Model Group's efforts to create a national health data model to facilitate the sharing of data across jurisdictions and technical platforms. Identify and support existing and proposed Health Canada data models and integrate them into CIHI's emerging national health data model. Identify areas in which the data model could be 'drilled down' to enable sharing across databases. Use modelling techniques to map and improve existing business processes.

3.3 Adopt tools and protocols for sharing data and information electronically.

Adopt standard technologies and business processes for structuring data and information to enable electronic access and exchange. Adopt, in consultation with partners, standards that ensure openness, search and retrieval capability, and continued structural integrity. Adopt associated business processes to ensure that data and information are captured and used seamlessly in the course of executing the business function. Examples of protocols include the SGML format for structuring textual information (used in the Therapeutic Products Directorate of the Health Protection Branch), the Win Dais tool for accessing large numbers of databases from one point (used in the Health Programs and Promotion Branch), and intranets for

"XML: A New Tool for Government to Do More with the Web?" by John Dingwall in Canadian Government Executive, vol 4 # 4

"Organizations and 'communities of practice' can develop standard structures and components for documents like memoranda, analyses, reports or journal articles. It will then be possible to search across the sets of documents for items such as conclusions, recommendations, abstracts, and summaries, and to retrieve and assemble these in various useful ways."

organising and giving one-window access to corporate information (used in Industry Canada and elsewhere).

Use business case approach to adoption of new technologies. Continue to integrate business and IM/IT planning, through IM/IT committees. Implement mechanisms by which business managers who identify a need can get the required assistance, be it technical, business, or human resources related, in formulating a solution. The project management office in the Information Management Services Directorate of the Corporate Services Branch does this for Health Canada already, but a mechanism for dialogue and collaboration with partners and other departments on similar projects should be identified or established in order to avoid 'reinventing the wheel'. National Archives, for example, maintains an inventory of electronic initiatives in the area of records management and sets general guidelines in consultation with other departments. Initiatives of this kind should be identified and news of them disseminated.

Promote awareness of the capabilities of electronic access tools through the use of information sessions and forums. Establish an inventory of relevant entrepreneurial projects both within and outside the department. Provide forum for those who are implementing structured information and reengineering processes to share information. Identify and publish best practices.

As quick hits, adopt and expand proven technologies such as an intranet, extranet, and Internet. Develop the intranet for Health Canada to share information as a working tool for employees. Develop an extranet capacity within Health Canada to allow for communities of practice to extend outside of the HC Enterprise Network, to include trusted partners (e.g., one could develop an extranet to link certain areas of Health Canada to provincial networks, in such a way that one could control which areas of the Health Canada Enterprise Network were accessible by the provinces). Continue to improve the Health Canada World Wide Web (WWW) site both as a source of information on health and the health system and a gathering place for health professionals and the public.

Health Canada

LATEST HEADLINES

30 October 1998

Canada

3.4 Remove barriers to access.

Polling conducted for the Cabinet Committee on Communications

Canadians said they would like to see data banks centralized so they don't need to redo medical tests. Some also saw this as an illustration of integration... If it is linked to positive health outcomes, there is less concern about privacy... There would be concern if the goal was to create consumer profiles that individuals don't know about and for credit rating purposes. But for security and health concerns, they are prepared to suspend some of the control over personal information.

Assess the overall policy and procedural framework within which partner organisations currently grant access to information. Liaise internally and with partners to identify the major policy, procedural, and cultural barriers to granting access across jurisdictions and determine where these barriers are most problematic. One problem that has been identified by population health researchers is difficulty gaining access to statistical information that is stored with Statistics Canada. It is thought that partners, in turn, may have difficulty gaining access to information held within Health Canada. An example of a barrier that limits access in both directions is the requirement for all partnership information to be considered as departmental records and managed as such. The department needs to raise this issue with the National Archives, not only for the health system, but for all departments as all departments are entering into cross-jurisdictional partnerships.

Participate in and support CIHI's six working groups in defining and adopting emerging standards for health informatics/telematics and "enable the development of national, longitudinal electronic health records, accessible to health providers, researchers, policy makers, as well as health monitoring and surveillance agencies." The affected areas range from adopting common technical standards to defining privacy considerations.

IV.4 Share health knowledge thoughtfully.

4.1 Encourage the formal and informal identification of and support to communities of practice.
4.2 Facilitate sharing proactively.
4.3 Communicate health knowledge effectively and efficiently.

4.1 Encourage the formal and informal identification of and support to communities of practice.

Community of Practice

A community of practice is a group of individuals, defined by similar interests or business objectives and not necessarily by organization, who create, share and use knowledge to achieve a common goal. Knowledge management theory addresses ways to identify and support communities of practice.

Establish a capacity to help communities share information proactively, using learning resources and groupware technology. Identify and build on existing initiatives and communities, such as the Canadian Health Network, the cancer group, and the Health Protection Branch's IM Working Group. Develop a plan for institutionalizing a capacity to assist workgroups to work more collaboratively. Identify best practices and successful groupware and disseminate this knowledge. Promote learning and the exchange of knowledge through informal practices.

4.2 Facilitate sharing proactively.

Encourage the sharing of information with colleagues. Pass along the context, and why it is that the information is thought to be useful or beneficial. This is especially important for health workers who have taken on new jobs or assignments.

Excerpt from "The Therapeutic Products Program Knowledge Management Strategy":

[We] need to understand the sources of knowledge, based on user-centric work activities:
- What is it that you do?
- How do you do it?
- When do you do it?
- Where in the organisation does it fit?

Develop guidelines and procedures for passing along knowledge and information as a matter of course in one's work, and as an employee moves on to a new job, resigns or retires (including how to pass along or archive e-mail, what the manager's responsibilities are vs. the employee's, etc.). Mandatory exit procedures would be one example of a knowledge sharing procedure. Less formal, tacit procedures, such as the process used to gain approval for a file, should be identified and documented where necessary in order to communicate them to new employees and to make them more consistent and coherent.

Information on the importance of sound knowledge sharing practices should be incorporated into the orientation process for new employees and the continuous learning process for all employees. The mentoring program could be adjusted to suit this purpose, for example, and modules could be added to existing learning initiatives. The department could use seminars to further promote knowledge sharing. The department should furthermore make important results, findings, publications known.

Promote and encourage the use of electronic systems where information can be readily accessed, shared and re-used.

4.3 Communicate health knowledge effectively and efficiently.

As much as is possible, logical and reasonable, provide single-window access to health information in the consumer's choice of medium. Make health information available electronically via such media as the Canadian Health Network and the new Health Canada electronic magazine REAL Health (http://www.hc-sc.gc.ca/real). Review communications policies and guidelines to ensure that roles and responsibilities for good communication are clear.

IV.5 Manage health knowledge well.

5.1 Establish knowledge business specialists.
5.2 Manage records through their life cycle.

5.1 Establish knowledge business specialists.

The table on the following page outlines, from the knowledge management perspective, the traditional roles in Health Canada. It shows how the introduction of knowledge management would cause those roles to be augmented, refocused or changed.

Role	***Goal(s)***	***KM Focus***	***Who Does This Now?***
Knowledge Domain Experts: *these execute the primary business functions of the department*	deliver on a business line	leveraging the knowledge inherent in staff, colleagues, partners, information and data to fulfil their operational goals.	program managers; all Health Canada employees
Technical Experts: *these are responsible for technical advice*	ensure organisational effectiveness and efficiency	provide expertise on key aspects of knowledge infrastructure, such as IT, records, learning and others	computing specialists; communications specialists; records managers; others
Knowledge Business Specialists: *these provide integrate business, knowledge and information needs and IT technical advice to support the Domain Expert*	ensure knowledge is used to help Canadians maintain and improve their health	providing expert advice to domain experts on ways they can use knowledge to fulfil their goals; acting as a catalyst to make KM initiatives happen; improving department's overall KM capacity	**no one**

Primary responsibility for managing knowledge to support the business of the department belongs to, and should continue to belong to, the domain experts. They know better than anyone else what the business is, and, by extension, what knowledge is required to deliver on it.

The role of infrastructure experts is to help the domain experts execute certain specialised functions. In the case of a knowledge management initiative, for example, the domain expert would rely on a computing specialist to help identify and put in place the required technology tools and a human resources specialist to help train staff and redefine positions, among others. These infrastructure experts are valuable not only because of their specialised knowledge, but also because they maintain an overview of their particular area of expertise. For example, a computer specialist knows what technology is in place in the department, what its functionality is, who is responsible for it, and what the larger technology trends in the world are.

The concept for a knowledge business specialist is a person who would fulfil an equivalent role for knowledge. This specialist would:

- provide expert advice to domain business managers on whether to, when to, and how to, implement a knowledge management initiative
- coordinate between different domain managers and infrastructure experts to execute knowledge management initiatives
- put in place a framework for knowledge management in the department, helping to identify knowledge gaps and barriers to knowledge sharing

In creating a specialised knowledge management function, the department runs the risk of creating something that domain managers rely on as a crutch to protect them from having to take this role over themselves. However, given that knowledge management constitutes a wholly new way of conceptualising and conducting the business of the department, and given the time and cultural constraints on domain managers, the knowledge business specialist is required to 'plant the seed' of knowledge management and build capacity.

"The Coming of the New Organization", by Peter F. Drucker, in Harvard Business Review

"Because the 'players' in an information based organisation are specialists, they cannot be told how to do their work. There are probably few orchestra conductors who could coax even one note out of a French horn, let alone show the horn player how to do it. But the conductor can focus the horn player's skill and knowledge on the musicians' joint performance. And this focus is what the leaders of an information-based business must be able to achieve".

Some believe that once knowledge management becomes a habit, and a knowledge management framework (consisting of maps, methodologies, architectures etc.) is in place, the specialised function will 'wither away' and become subsumed within the ordinary work of the department. The success of the knowledge business specialist would consequently be measured in his or her own ability to put him/herself out of business, to leave the experts as a collaborative team requiring little or no facilitation. Others, however, believe that the knowledge business manager will become as valuable a source of support as one's human resources or financial advisor. The department should determine what is required to create this function and what its operational goals should be, and it should monitor the continued utility of maintaining this specialised function.

5.2 Manage records through their life cycle.

The Health Canada project to develop a records management system is a critical element of any good knowledge management strategy. Sound records management will ensure that corporate memory information is captured, retained, and made accessible, and that convenience information is deleted before the volume becomes burdensome. Authentic and reliable records, once they are routinely captured and structured, will help us to meet our decision-making, program delivery and accountability requirements.

Definition of a Record

- means information, regardless of physical form, created, collected or received in the initiation, conduct and completion of an activity, including any correspondence, memorandum, book, plan, map, drawing, diagram, pictorial or graphic work, photograph, film, microform, sound recording, videotape, machine readable record, and any other documentary material, regardless of physical form or characteristics and any copy thereof. (National Archives of Canada definition)

- is that which is created and kept as evidence of agency or individual functions, activities and transactions. To be considered evidence a record must possess content, structure and context and be part of a record keeping system. (National Archives of Canada) Australia definition)

V. Strategic Priorities: Framework for Setting Knowledge Investment Priorities for the Next Three to Five Years

Three strategic domains have been identified for positioning Knowledge Management and IM/IT investments, they are: Creation, Research and Analysis; Tools, and Information Management; and Dissemination and Communications. An additional grouping, Multi-faceted Initiatives, reflects initiatives covering all three of these strategic domains. All groupings are considered equally important and the initiatives listed underneath are in no particular order. This framework does not address the scope of the initiative nor does it assess the cost, benefits or impact on people.

V.1 Creation, Research and Analysis

1.1 Creating the Right Data and Information and Conducting Good Analysis.

- create a discipline of applied health analysis within Health Canada
- use analysis to establish what data and information exist, are needed, the gaps, and focus on filling gaps in priority areas
- work with CIHI and Statistics Canada on "The Roadmap"
- support the Canadian Population Health Initiative

1.2 Targeting Research to Fill Knowledge Gaps.

- through the establishment of an entity to develop the departmental position on, and to influence, the health research agenda in which there are many partners: MRC, CIHR, NHRDP, CHSRF, SSHRC

1.3 Leading the Cultural Change.

- leverage the experiences, expertise, information and knowledge of individuals
- for greater collective organizational success by fostering sharing in a continuous learning environment
- to improve analytical capacity and develop analytical discipline
- courseware, communities of practice, champion sharing (townhalls, presentation, focus groups, expert speakers, practitioner panels, reward program, etc.)

V.2 Tools and Information Management

2.1 Making Information Available Internally.

- intranet, e-mail, groupware, Secure Electronic Service Delivery (SESD)/ Public Key Infrastructure (PKI), standards

2.2 Building Health Canada's Capacity to Manage KM, IM and IT.

- establish a CKO and Knowledge Business Specialists

- develop a Knowledge Management Architecture to provide a framework for decision-making on Governance & Planning, Knowledge & Information, Applications & Technology

- establish policies, standards, plans, committees, where required

2.3 Building and Maintaining IM Infrastructure and Tools to Support Knowledge Management.

- data/information models, knowledge maps, records management application, standards

2.4 Building and Maintaining IT Infrastructure and Tools.

- make investments to build Y2K-compliant, evergreen infrastructure, to support departmental business lines and the CHI initiatives

- common administrative (financial, human resources, assets and information management) systems

- SESD/PKI

V.3 Dissemination and Communications

3.1 Establishing NEW Canadian Health Infostructure initiatives.

- through initiatives supported by the OHIH such as the Minister's Advisory Committee and their Interim Report

- through the development of the proposed Knowledge Innovation and Investment Office (consider such things as the National Health Library of Canada concept, the concept of a national health PKI)

3.2 Interacting Securely with Trusted Partners.

- building extranet capacity, SESD/PKI, standards, Internet

3.3 Making Health Information Available Externally.

- Canadian Health Network, Health Canada's WWW site, seminars, conferences, press releases and other communications methods

- Internet and WWW services, SESD/PKI, standards

V.4 Multi-faceted Initiatives

The following two projects are multi-faceted initiatives which cover all three strategic domains.

4.1 Building the National Health Surveillance Infrastructure.

- Secure Electronic Service Delivery (SESD)/PKI

4.2 Building the First Nations Health Information System.

- SESD/PKI

VI. Implementation Plan

Last November 9, 1998, the Deputy Minister and Associate Deputy Minister announced the creation of a new branch, *Information, Analysis and Connectivity (IACB)* with Denis Gauthier as ADM. The directorates of this new branch, as reported in the announcement are:

- Applied Research and Analysis (new) (ARA)
- to include the Research and Knowledge Development area of the Health Promotion and Program Branch
- Office of the Health Information Highway (OHIH)
- Information Management Services Directorate (IMSD)

The vision, strategy and recommendations stemming from this document may serve as a blueprint for future action in the newly created branch. At this time, some recommendations still need further discussion to determine who should be accountable, some require shared responsibilities and the creation of horizontal partnerships. In general, recommendations are addressed by the creation of the new branch and its directorates.

A recommendation requiring further attention includes the requirement for a KM strategic capacity: to develop overarching KM strategy, to develop and implement cultural initiatives and including a cadre of knowledge business specialists. The next important step will be discussions and plans for how the new branch should lead the implementation of the Strategic Initiatives.

Appendix A - Governance for the Vision and Strategy Initiative

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Visionary Committee -- List of Members

Brewer, Alexa / MSB
Butterfield, Andy / Chair, Information Technology Advisory Committee (ITAC)
Bull, Fruji / CSB, DG-IMSD
Carman, Mary / DMO (DEX)
Connolly, Carmen / HPPB
Fortier, Marie / PCB Acting ADM
Franklin, Claire / PMRA
Gauthier, Denis (Chair, Visionary Committee)
Gorman, Diane / RDG (West)
Hunter, Greg (Secretary)
Jock, Richard / Chair, Committee for Information, Technology and Holdings (CINTH)
Mintz, Jim / Chair, Advisory Committee on Information Holdings (ACIH)
Rallis, Gina / Learning and Development, CSB
Reissman, Christine, PCB
Ross, William / HPB

HIS Internal Steering Committee -- List of Members

Bull, Fruji, DG-IMSD
Cochrane, Paul / MSB
David Dodge (Co-chair)
Fortier, Marie / PCB
Gauthier, Denis / IACB
Lafleur, R.S. / CSB
Lee, Jerry / Bellefeuille, Peter (Secretary)
Losos, Joe / HPB
Nymark, Alan (Co-chair, Project Sponsor)
Pascal, William / RDG (Central)
Potter, Ian / HPPB
Shugart, Ian / HPB-0SRA
Siman, Andrew, DG-OHIH

Knowledge Management Initiative Group - Staff

Hunter, Greg
Boulet, Michelle
Leblanc, Lise
Coppard, David
Dénot, Rosie
Côté, Lucie

Appendix B - Policy and Legislative Environment

Health Canada receives its mandate from, and is responsible for adhering to, a variety of pieces of legislation and policies that both define its role in Canada and govern the manner in which it executes that role. Any knowledge management strategy will consequently need to enhance the department's ability to fulfill its legislated role without compromising its ability to comply with the requirements and constraints that legislation imposes.

The legislation upon which Health Canada is founded is the *Department of Health Act*. This Act defines a number of roles and responsibilities for the department, ranging from promoting the well-being of Canadians to protecting Canadians against diseases to establishing safety standards for consumer products. It also assigns responsibility to Health Canada for administering other Acts. The most notable of these is the *Canada Health Act*, which establishes the criteria and conditions upon which transfer payments to the provinces for health services are predicated. In addition, the department is responsible for about twenty other pieces of legislation on such subjects as food and water quality, drugs, tobacco, pest control, and quarantine measures. The tasks associated with fulfilling these roles - reviewing drugs, for example - are very knowledge and information intensive and will consequently tend to shape the knowledge management strategy accordingly.

In its day to day activities, the department is also responsible for adhering to various cross-governmental policies and pieces of legislation which govern the accessibility, use, and management of government information. Access is governed by the *Access to Information Act* and the *Privacy Act*: the latter provides a right of access to information in records under the control of Health Canada, while the former protects the privacy of individuals with respect to personal information about themselves. Use and management of information issues are governed by the *National Archives Act*, the "Management of Government Information Holdings" policy, and a variety of internal departmental policies, such as the "Records Management" policy. These establish departmental requirements for managing information through its life cycle, preserving corporate memory and Canadian heritage, and utilising information as a corporate resource. In addition to being mandatory, they aim to serve many of the same principles as knowledge management; a knowledge management strategy can consequently both reflect them and use them as a foundation.

In addition to the major Acts and policies, there are a myriad of pieces of legislation and policies, federal, provincial, and international that govern specific jurisdictions and aspects of health service provision, information management and information technology. Provinces, for example, have their own legislation and policies on issues ranging from health service provision to privacy, all of which have an impact on the way they produce and share knowledge. Similarly, the United States and other countries have policies and legislation to govern things like disease control and drug approvals, to name two, that pertain to the knowledge work Health Canada does. Within the federal government, the Communications Policy, Federal Identity Program, and Official Languages Act contain many requirements that govern the provision of information and knowledge to employees and the public. Furthermore, the "Management of Information Technology" policy, the "Enhanced Framework for the Management of Information Technology Projects", and the "Blueprint for Renewing Government Services Using Information Technology", all from Treasury Board, establish criteria for enhancing information technology infrastructure, and the Government Security Policy contains provisions that can apply to virtually all activities undertaken by the department.

The department's knowledge management strategy must reflect the overall purposes that have been assigned to Health Canada in legislation, and ensure compliance with the cross-governmental legislation and policies that govern its use of information and other resources. The task is made easier by the fact that many of these pieces of legislation and policies, having been crafted to ensure the capture and preservation of government information in a consistent fashion, are founded on the same principles as knowledge management. A knowledge management strategy can be presented as a further enhancement to and rationalisation of existing government legislation and policies; it can serve as a bridge between the legislation governing Health Canada's role and the legislation governing the management of Health Canada's information.

Appendix C - An Example of Knowledge Being Used to Protect the Health of Canadians

STEP & Primary Participant	Example	Knowledge Applied	Knowledge Produced
1. A company prepares a submission for a new pesticide	Acme Pesticides, develops a pesticide, called Aphidex, that kills aphids without harming delicate plants. It prepares a submission in hopes of marketing Aphidex in Canada.	• knowledge of chemicals and pest biology • knowledge of market demand • knowledge of the regulatory environment • expertise of researchers	• a recipe for a pesticide and a large quantity of supporting data relating to what is in it and how it works
2. PMRA reviews and evaluates the submission	PMRA reviews the data on Aphidex that was provided in the submission and determines that small children could develop rashes if the pesticide were to come in contact with skin, that its effect on the environment is negligible, that it works, and that it would be good for the Canadian horticultural industry, especially orchid growers	• knowledge of pest biology and chemicals • knowledge of risk factors relating to human health • knowledge of risk factors relating to the environment and plant and animal biology • knowledge of the economy • knowledge of similar pesticides in use in other countries • researchers' expertise	• information on how the pesticide would affect human health and the environment and under what conditions • objective information on whether the pesticide works • objective information on what value, economic or otherwise, the pesticide would add to Canada
3. PMRA makes a regulatory decision	PMRA registers the drug on the condition that the label and instructions indicate that children should avoid contact with sprayed areas for 2 hours after spraying	• knowledge of government regulations • knowledge of the public's concerns regarding pests and pesticides	• information on why the product should or should not be released on the market and under what conditions
4. Information on the decision is disseminated	A citizen in Edmonton sees her neighbour spraying Aphidex on a flowerbed near her children's swing set. She calls the PMRA hotline and asks whether she should be concerned. The operator tells her to keep her children away from that spot for a couple of hours as a precaution.	• knowledge of public, industry, provincial, and activist interests • knowledge of techniques and vehicles for disseminating information • knowledge of regulatory requirements for disclosing information	• labels and instructions for safe use • general product information which producers, consumers, and third parties groups can use to make decisions to protect their health and the environment

Appendix D - Proposal for the Knowledge Management Architecture for Health Canada

The Knowledge Management Architecture - containing three elements:

1. Governance and Planning	-	Managing
2. Knowledge and Information	-	Informing
3. Applications and Technology	-	Applying Technology

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1. Managing:

Governance (how does the department wish to invest in and manage knowledge assets)

- policies (must do)
- standards (commonly preferred tool or procedure)
- guidelines (how best to do)
- committees (consensus-seeking forum)

Planning (who does what, when)

- strategic (3- to 5-year vision, principles, strategy, plans)
- investment (annual IM/IT plan, emerging technologies)
- project (enhanced management framework, risk management methodologies)
- operational (workplans, communications, learning and development)

2. Informing and
3. Applying Technology:

These two elements of the Knowledge Management Architecture would address Services and Assets in a Governance and Planning context.

Services (what services are provided by whom, who pays)

- knowledge (knowledge business specialist (KBS), learning)
- information (library, records, knowledge maps, directory)
- applications (corporate mainframe and network-based)
- technology (network, e-mail, Internet)

Assets (what are our valued knowledge-related resources)

- people and knowledge (experience, expertise, tacit knowledge)
- information (records, books, WWW information, documents)
- software (operating and business systems, enterprise software tools)
- hardware (mainframe, network, LANs, PCS)

Appendix E - Integration of Health Canada's Contribution within the Canadian Health Infostructure

The following table has been developed as an architectural tool for integrating Health Canada's contribution within the Canadian Health Infostructure. One could define each layer to be a type of architecture or the full spectrum, across the layers, could be defined to be an overarching architecture. These architectures are interrelated; an application architecture, for example, will place certain demands on management that will have to be incorporated into the Management architecture, and all architectures will ultimately have to produce measurable outcomes that serve the business.

Layer	Key Integration Issues			Sample
Outcome	Benefits? Value add? Why are we doing this	Stakeholder buy-in Managing expectations	Measurable Outcomes	- National action plan on vaccination program response to information analysis
Output	What services/products? How delivered	Setting standards Measuring performance	Managing Expectations	- Single window access to HC's CHI contributions
Management	Management office Governance structure Communications	Project management Risk management Business case	Marketing Legislations	- Business case reflecting business and information integration realities with F/P/T
Business	Business models Business processes	Methodologies Access rules	Business Standards	- Departmental process on access to external information collection - standard data dissemination approach from multiple HC environments
Data and Information	Meta data Data model Data dictionary	Repository/Warehouse Privacy Nomenclature	Data Standards	- Meta data standards and intelligence access environment - Common privacy model - Common information architecture
Applications	Database standards Common functions	Look and Feel Interface (APIs)	Application Standards	- Open and standard based operating environment - Same look and feel
IT infrastructure	Architectural concept IT services Physical Network Inter-operability	Help/Support Reliability Manageability Protocols	Performance Standards Scalability Security	- Secure departmental PKI - Reliable Internet Services - Appropriate HC Bandwidth - Extranet facilities

Appendix F - Building a Policy/Research Capacity in Health Canada

Within Health Canada and in the larger health community, there is increasing recognition that health is determined by a range of factors, from biological-makeup and personal health practices, to interventions in the health system and the influences of the physical and socio-economic environment. It has therefore become increasingly important for the department to base its policy decisions on an understanding of these factors, including the impact of its own policies. The department needs to know how it can best make investments in research and knowledge development to improve the health of Canadians and to be accountable for its policy decisions.

In building a policy/research capacity, the department needs to address a generic set of activities known as the policy development life cycle. Each of these activities has certain research requirements associated with it. A policy process often begins with the identification of an emerging issue. Ideally, the issue is then investigated and a range of possible policy responses are identified and explored through consultation. Eventually, a preferred option is selected and a policy adopted. It is subsequently communicated and translated into action through programs, infrastructures, or funding mechanisms. Following implementation, the policy is evaluated and revised as appropriate. In general, the department follows these steps, but often the process is not informed by research.

To enhance the department's capacity to incorporate research into its policy making process, five key objectives must be addressed:

- determine the types of research that are relevant to policy-making in Health Canada and describe how these research types inform the various phases in the policy-making cycle;
- identify the key organizations/networks currently conducting policy-relevant research and indicate how they relate to Health Canada;
- identify the major information gaps in the policy cycle, to determine the types of research required to address these gaps, and to identify possible Health Canada roles (eg. are there phases in the policy cycle where there are research deficits?)
- determine the conditions which support policy-relevant health research; describe how these conditions vary throughout the policy cycle; and determine how Health Canada could contribute to the creation of these conditions;
- study the nature of effective policy/research links throughout the policy cycle and develop mechanisms for strengthening these links.

The outcome will be a department in which researchers and policy makers are better able to work together to ensure that policies are based on the best possible information and that policy actions are evaluated by the most appropriate and effective mechanisms. In addition to improving its capacity to make effective decisions, the department will be better able to show whether its decisions were effective in improving the health of Canadians.

Appendix G - Glossary of Acronyms

ACIH	Advisory Committee on Information Holdings
CANARIE	Canadian Network for the Advancement of Research, Industry and Education
CDC	Centres for Disease Control (U.S.)
CHI	Canadian Health Infostructure
CHSRF	Canadian Health Services Research Foundation
CIHI	Canadian Institute for Health Information
CIHR	Canadian Institutes of Health Research
CINTH	Committee on Information Technology and Holdings
CISTI	Canadian Institute for Scientific and Technical Information
CKO	Chief Knowledge Officer
CPHI	Canadian Population Health Initiative
CSB	Corporate Services Branch
DMO	Deputy Minister's Office
FDA	Food and Drug Administration (U.S.)
HIS	Health Information Strategy Internal Steering Committee
HPB	Health Protection Branch
HPPB	Health Promotion and Programs Branch
IM	Information Management
IT	Information Technology
KIIO	Knowledge Innovation and Investment Office
KM	Knowledge Management
KMA	Knowledge Management Architecture
KMLC	Knowledge Management Life Cycle
LAN	Local Area Network
MRC	Medical Research Council
MSB	Medical Services Branch
NHRDP	National Health Research Development Program
OHIH	Office of Health and the Information Highway
PC	Personal computer
PCB	Policy and Consultation Branch
PMRA	Pest Management Regulatory Agency
PRI	Policy Research Initiative
RDG	Regional Director General
SGML	Standard Generalized Markup Language
SSHRC	Social Sciences and Humanities Research Council
TPP	Therapeutic Products Program
WHO	World Health Organisation
XML	Extensible Markup Language